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ABSTRACT

The development of English syntactic maturity was investigated among Chinese secondary school students learning English as a second language. Narrative and expository compositions written by 60 students at three grade levels were analyzed for increases in T-unit length, clause length, number of clauses per T-unit, and the use of nominals, adverbials, and coordinations within T-units. T-unit length, clause length, and number of clauses per T-unit were found to increase with grade level as well as from expository to narrative writing. Similarly, use of nominals and adverbials increased with grade level, with greater increases in the expository than in the narrative compositions. There was not a significant increase in use of coordinate structures between grade levels, indicating that this transformation is acquired early. The syntactic development of the students showed a notable resemblance to that of native English speaking students, indicating the employment of common language learning strategies. (Author/RW)

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SYNTACTIC DEVELOPMENT IN THE WRITING OF ESL STUDENTS

by

MARGARET SIN-SIU YAU

B.A., The Chinese University of Hong Kong, 1975

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ABSTRACT

The current study examined the development of syntactic maturity in a group of Chinese secondary school students learning English as a second language (ESL). The compositions of these students written in response to two tasks (a narrative assignment and an expository assignment) were analyzed for increase on the use of three syntactic measures (T-unit length, clause length and number of clauses per T-unit) and three grammatical structures (nominals, adverbials and coordinations within T-units) across three grade levels and between two modes of writing.

The scores were analyzed by ANOVA in a 3(grade) x 2(mode) factorial design. A stepwise discriminant analysis was also carried out to isolate grammatical structures that best discriminate the writing across the three grade levels and between two modes of writing.

Results indicated that there were significant differences in T-unit length, clause length and number of clauses per T-unit across the three grades and there were also significant differences in T-unit length and clause length between the two modes of writing. These differences were accounted for by the increase on these measures from the lowest grade (F.3) to the highest grade (F.7) and also from the expository assignment to the narrative assignment. Moreover, there was a significant interaction between mode and grade in T-unit length and clause length, caused by the non-parallel increase with grade levels

between the two modes of writing. The increase in T-unit length and clause length between F.3 and F.7 was much greater on the expository assignment than on the narrative assignment.

A similar increase and interaction was found in the grammatical structures. Both the nominals and adverbials increased with grade level, and as with the syntactic measures discussed above, the increases were much greater on the expository than on the narrative assignment. There was not a significant increase in the use of coordinate structures between grade levels, supporting other researchers' claims that this is a transformation acquired early.

The ESL students in the current study showed a remarkable resemblance to native English speaking students in terms of syntactic development. Not only was the increase in the syntactic measures similar to the growth trend found with native English speaking students, but the grammatical structures that distinguished the compositions at the three grade levels were also very similar to the mature structures isolated in other studies. One implication that can be drawn from this study is that the similarities between these ESL students and native speakers in the employment of syntax reflects common cognitive strategies that underlie the language learning task. Morever, since the study shows that there is a developmental trend, perhaps proven techniques (such as sentence combining) can be tried on these students to test if the syntactic growth can be speeded up.

J. H. Delanzo

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CHAPTER ONE

AN INTRODUCTION TO THE STUDY

The purpose of conducting this study was twofold: 1) to find out whether the compositions written by a group of Chinese secondary school students learning English as a second language (ESL) show that these students increase their syntactic maturity in the second language as they reach a higher level of second language learning, and whether their development in syntactic maturity is similar to the development exhibited by native speakers of the target language; and 2) to find out if these ESL students employ different syntactic options at three levels of second language learning (intermediate, advanced, and very advanced) and in two modes of writing (narrative and expository) so that this understanding can form the basis for further research into curriculum materials which would improve the writing performance of these students.

One focus of this study was on the development of syntactic maturity. Syntactic maturity has also been the focus of many studies that investigate the changes that occur across different age or treatment groups in the written or oral language samples of English speaking students. Syntactic maturity is a term originated by Hunt (1965) and used by later researchers (e.g., O'Hare, 1973; Stewart, 1978; Morenberg et al., 1978). Different researchers have different definitions for this term. For example, Hunt used the term to designate 'the observed

characteristics of writers in an older grade' (p.5). O'Hare defined syntactic maturity in a statistical sense as 'the range of the sentence types found in samples of the students' writing' (p.19). Some researchers have also used the term 'syntactic fluency' (e.g., Mellon, 1969) or 'syntactic complexity' (e.g., Crowhurst and Piche, 1979) to refer to the syntactic options exhibited by students at a particular grade level. However, despite the different definitions, in essence, syntactic maturity (or fluency or complexity) refers specifically to the ability of a group of speakers or writers to employ sentence combining transformations so that subsidiary propositions are subsumed under more general ones to make explicit the interrelations between the propositions and to achieve economy and succinctness in expression. This implicit or explicit reference by researchers to the ability to combine sentences is evident in the fact that syntactic maturity is measured by the T-unit--an index developed by Hunt--and that greater syntactic maturity is reflected in longer T-units, the latter generally being lengthened in proportion to the number of sentence combining transformations performed.

This study was prompted by the desire to understand one aspect of second language development, i.e., how these ESL students expand their syntactic options as they reach a more advanced level of second language learning, or using the terminology in most studies, how they grow in syntactic maturity. In studies with native English speaking students, syntactic maturity, measured by T-unit length, is found to

increase with each higher grade level. This trend is apparent in the speech and writing of kindergarten and elementary school children (O'Donnell et al., 1967). It is also apparent in the writing of older students and skilled adults (see the two studies by Hunt, 1965 and 1970). Syntactic maturity is also found to increase with university level students at each successive years (Stewart, 1978). These studies, then, show that for native English speaking students at least, along with an increased communicative ability (Grimm, 1975) and an expanded linguistic repertoire which are signs of maturation, there is also a growth in syntactic maturity over the years. Another convincing support for this claim is the study by Loban (1961, 1963, 1964, 1976). In his longitudinal investigation of the language development of students from kindergarten to grade twelve, Loban examined the ability of students in three groupings--a high language ability group, a low group and a random group--to manipulate syntax, to employ vocabulary, and to present a coherent and fluent discourse. He supplemented his study with a measure of the students' reading ability, listening ability and IQ as well as a subjective rating by their teachers. He found that the ability of students in each group to manipulate syntax (reflected espeically in the number of words in the communication unit--a measure similar to the T-unit) showed the most consistent growth over the thirteen years and that this ability was the best discriminator between the high language ability group and the low language ability group. These studies are reviewed in Chapter Two. If syntactic

maturity reflects development in syntactic control for native English speaking students, it is reasonable to assume that syntactic maturity in the second language will also reflect development in syntactic control of the learners in that language.

The study of syntactic maturity also provides a new perspective with which to look at the development of writing abilities of second language learners. Zamel (1976) expressed concern about the reliance of second language writing programs on controlled and guided materials which is a reflection of the emphasis of these programs on the prevention or eradication of errors. She suggested that second language instructors should learn from first language research and reduce the emphasis on errors. However, since the publication of her article, there have been few changes in such programs as is evident from the paucity of new textbooks for such programs that are not based on guided materials. To bring changes to such programs, the teaching profession must be shown that the development of second language writing abilities can be viewed from a perspective other than the error-oriented perspective. The current study, then, shows that the study of syntactic maturity provides one such perspective. By studying the growth of syntactic maturity and investigating the syntactic options exhibited by the learners at different points of growth and in response to different writing tasks, this study attempted to provide a better understanding of how the syntactic structures of the less advanced second language learners evolve to the more complex

forms at later stages of second language learning and how these learners grow in their ability to manipulate syntax to suit the writing task. Since syntactic structures are one of the major components for the conveyance of ideas, such an understanding can form a basis for research into the construction of curriculum materials that will aid syntactic growth, and, perhaps, improve writing performance.

This study, then, looked closely at the syntactic structures employed in the writing of a group of second language learners at three levels of second language learning and in two modes of writing. The changes in the syntactic structures across the three levels and between the two modes were measured by means of T-unit length, clause length, and number of clauses per T-unit. To discover the components of the change, grammatical structures produced by sentence-combining transformations were isolated and analyzed.

A. An overview of the experimental procedures

This study looked into the development of syntactic maturity in a group of Chinese secondary school students learning English as a second language (ESL). Students at three grade levels were chosen to represent intermediate ESL learners, advanced ESL learners, and very advanced ESL learners. An interval of five years separated the very advanced ESL learners from the intermediate ESL learners, an interval which researchers (e.g., Hunt, 1965) have found to be long enough for

significant differences to be detected between the groups in terms of the syntactic structures they employ. Beginning ESL learners were excluded from the analysis because it would be difficult to elicit written discourse (in the form of free writing) from beginning learners. Another reason they were excluded is that the T-unit analysis, the principal tool for this investigation, is useful only beyond a certain level of development in the target language, as suggested by Gaies (1980).

The students in each of the three grades were asked to write two compositions, one in response to a narrative assignment and the other to an expository assignment. To make comparisons across grades reliable, all students wrote on the same two topics within the same given time. Although test-like conditions where students work on their own without any help are desirable for control purposes, it is also likely that under such conditions students would not put forward their best performance. In this research, a series of rewriting procedures was designed to ensure that students put forward their best efforts so that the syntactic structures produced in the writing would be representative of what they were capable of producing (see Chapter Three).

To understand the development of syntactic maturity and the writing strategies employed by these second language learners, their writing was analyzed using the mean T-unit length, mean clause length, and the number of clauses per T-unit. Since these measures are widely used in syntactic development

research, data obtained on these measures could be compared with data obtained in other studies to find out if the development of syntactic maturity in these students follows the same trend as that of native English speakers or other second language learners.

Secondly, to find out exactly what distinguishes the writing of more mature students from that of younger students, transformationally-produced grammatical structures categorized into three types--nominals, adverbials and coordinations within T-units--were isolated and the occurrences of each of these structures in the writing at each grade level were tabulated and compared. Categorization of transformationally-produced grammatical structures under these three headings was pioneered by O'Donnell et al. (1967) and also adopted by later researchers (see Chapter Two). A comparison of the findings in this study with those in the other studies would reveal further whether these ESL learners develop syntactic maturity in the same way as native English speaking students do.

A third analysis involved comparing the writing of these students in response to two different kinds of assignments. One assignment asked for writing in the narrative mode; the other, expository. A comparison of the students' performance on the two assignments would enable one to understand better the writing strategies that these students employed as they responded to different writing tasks. A comparison can also be drawn between these students and native English speaking students (e.g., the research of Rosen, 1969; San Jose, 1972;

Perron, 1976; Crowhurst and Piche, 1979; Crowhurst, 1980) on how they differed from native English speaking students in their response to different writing tasks.

The rationale for employing these procedures is discussed in Chapter Two and the method of analysis is presented in Chapter Three.

B. Definition of terms

Terms central to this study are :

1. Syntactic maturity: the ability of groups of speakers or writers to perform sentence combining transformations so that subsidiary propositions are subsumed under more general ones to make explicit the interrelations between the propositions and to achieve economy and succinctness in expression. Because individual writers or speakers may vary their syntactic structures according to discourse demands and to their own stylistic preferences, syntactic maturity is defined here as a term reflecting group performance where individual variations are averaged out.

2. Second language learners: in general, learners learning a language other than their native languages. The term English as a second language (ESL), as used in this study, refers specifically to a learning situation where English is acquired in a school context and where use outside the school is rare, a

learning situation common to the students in Hong Kong. This learning situation is to be distinguished from situations where the ESL learners are immersed in an English speaking environment, such as ESL learning in Canada.

3. Transformationally-produced grammatical structures: those grammatical structures produced by sentence-combining transformations. They are categorized into three types--nominals, adverbials and coordinations within T-units.

C. Research questions

The current study examines the following major questions:

1. Will there be significant differences in mean T-unit length, mean clause length and mean number of clauses per T-unit in the compositions written by students at Form 3, 5 and 7?

2. Will there be significant differences in selected grammatical structures in the compositions written by students at Form 3, 5 and 7? What grammatical structures will best discriminate the writing produced by the students at the three grades?

3. Will there be significnat differences in mean T-unit length, mean clause length and mean number of clauses per T-unit between the compositions written by students in response to a narrative assignment and to an expository assignment?

4. Will there be significant differences in selected grammatical structures between the compositions written by students in response to a narrative assignment and to an expository assignment? What grammatical structures will best discriminate the writing done in response to the two assignments?

The study also examines the following subsidiary questions:

5. Will there be significant differences in mean T-unit length, mean clause length and mean number of clauses per T-unit in the compositions written by students in Form 3, 5 and 7 in response to a narrative assignment?

6. Will there be significant differences in mean T-unit length, mean clause length and mean number of clauses per T-unit in the compositions written by students in Form 3, 5 and 7 in response to an expository assignment?

7. Will there be significant differences in mean T-unit length, mean clause length, and mean number of clauses per T-unit between the compositions written by students at Form 3 in response to a narrative assignment and to an expository assignment?

8. Will there be significant differences in mean T-unit length, mean clause length and mean number of clauses per T-unit between the compositions written by students at Form 5 in response to a

narrative assignment and to an expository assignment?

9. Will there be significant differences in mean T-unit length, mean clause length and mean number of clauses per T-unit between the compositions written by students at Form 7 in response to a narrative assignment and to an expository assignment?

For the purpose of statistical analysis, the questions were translated into null hypotheses and tested at a .05 level of significance. These null hypotheses are given in Appendix A. The statistical procedures involved were 1) three-way analysis of variance to determine if there were differences among the three syntactic measures and the three types of grammatical structures; 2) stepwise discriminant analysis to find out which structures within each grammatical category best discriminated writing done by students among the three grade levels; 3)Newman-Keuls tests to determine between which two grade levels there was a significant difference; 4) Bonferroni t-statistics to make grade-wise comparisons on the syntactic measures within each mode of writing; and 5) t-tests for correlated measures to make mode-wise comparisons on the syntactic measures within each grade level.

D. Assumptions

The following assumptions underlie the study:

1. That mean T-unit length , mean clause length and mean number of clauses per T-unit can differentiate adequately syntactic maturity reflected in the writing done by students at the three grade levels. The efficacy of these measures with regard to native language data has been suggested by a number of research studies. These measures are also found to be indicative of the maturity of the writing done by university level students learning German as a second language or learning French as a second language (see Chapter Two). These measures, however, have not been tried on subjects similar to the subjects in this study (i.e., secondary school ESL students whose native language is Chinese).

2. That the sample size used in this study (an average of 200 words per composition and 400 words per individual student) is adequate to reflect the normal range of syntactic and grammatical structures used by these students. Research has not proved the minimun sample size required to most accurately reflect the normal range. O'Hare (1973) suggests that a sample size of about 400 words is as accurate as a sample size of 1000 words. Many researchers have come to regard this sample size as the minimum (e.g., Crowhurst and Piche, 1979). However, smaller sample sizes have been used by researchers and considered to be adequate. For example, O'Donnell et al. (1967) based their analysis of the syntactic maturity in the writing of elementary school students on a sample of about 200 words in grade 3 to about 500 words in grade 7. Hunt and O'Donnell (1970) used a

300 word sample to analyze the writing of grade 4 students. Combs (1976) also used a 300 word sample produced by grade 7 students. Those researchers basing their analysis on a rewriting passage (e.g., Hunt, 1970; Monroe, 1975; Stewart, 1978) have used sample sizes shorter than 200 words.

E. Limitations

Generalizability of the results in this study must not be extended to all second language learning situations. As specified in Section C, the second language situation in this study is confined to a school context. Formal generalizability of the results must also be qualified by the use of this particular group of subjects. These subjects seem representative of, but not formally generalizable to, classes of Form 3, 5 and 7 students studying in any government aided, Anglo-Chinese school in Hong Kong.[1]

F. Significance of the study

By looking at the development of syntactic maturity of a group of ESL learners, this study attempted to provide some additional information to the inquiry of whether these second language learners grow in their abilities to combine sentences as they gain experience in both second language learning and

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[1]Students admitted to such schools are usually of above average academic abilities as allocation to such schools is determined by the students' performance in a scholastic aptitude test.

writing. The increased ability to combine sentences is found to be one of the hallmarks of mature writers regardless of native language (see Hunt, 1977). It is also found to be the characteristic of more advanced second language learners (see Thornhill, 1969, Monroe, 1975, and Cooper, 1976). If these students show growth in their ability to manipulate syntax at a higher grade level, then they are approaching the second language writing task in a manner similar to native English speaking students and other second language learners. One implication that can be drawn from this is that the growth in the ability to combine sentences exhibited by the different groups of students as they grow in their language abilities is a reflection of common cognitive strategies that underlie all language learning tasks, a speculation raised by McLaughlin (1978).

In addition, an understanding of how second language learners develop their writing abilities will contribute to the design of better instructional methodologies and better language teaching materials in the second language classroom. Such an understanding can come only when one looks at the second language data from different perspectives. In the area of writing, the second language instructor has primarily looked at the data from an error-oriented perspective. Such a perspective may lead to the establishment of a hierarchy of developmental errors (an attempt made by many error-analysis researchers), but the pitfall of using such a perspective may be that so much emphasis is placed on errors that one tends to overlook other

important aspects of language development. This influence can easily be detected in a second language writing program given the prevalence of controlled writing and error correction exercises. What this study does is to look at second language writing from a second perspective--a syntactic perspective--thereby adding information of a new dimension to the existing data. The study of syntactic development in native English speaking students have led to studies of curriculum designs that aim at the improvement of writing performance, especially in the area of sentence combining. The findings of these studies have been used in new writing textbooks. It is hoped that this study would provide researchers with data that could form the basis for similar research to improve the writing performance of ESL students.

CHAPTER TWO

RELATED RESEARCH

Language development has been a topic of interest for many researchers. However, in order to trace this development, one has to isolate observable indices of growth. Since linguistic features are readily observable, it is not surprising that researchers have relied on their observation of such features as phonomes (e.g., Leopold, 1947; Ervin-Tripp, 1966; Ingram, 1974), morphemes (e.g., Berko, 1958; Brown, 1973; Dulay and Burt, 1974), and syntactic structures such as questions and negations (e.g., Milon, 1974) to draw conclusions about stages of language development.

When studies are conducted to investigate the language development of older children (e.g., school-aged children), they tend to concentrate on the syntactic aspect because it is assumed that phonology and morphology are acquired relatively early (see McCarthy, 1954; deVilliers and deVilliers, 1973), whereas syntatic development (especially acquisition of structures involving consolidation) is assumed to continue until the age of twelve or so (see Menyuk, 1971). These studies also tend to concentrate on native language data.

From a casual observation of children's language, one can see why researchers are more interested in the syntactic development of children than other aspects of language development. Children aged five or six already know reasonably

well the various inflectional rules and the phonemic changes that come with the changes in the articulation environment. However, their sentences are shorter and less complex than those of older children. It seems, therefore, that with older children, observation of their syntactic development will provide more information than investigation on morphology or phonology.

A. Various indices used to trace the syntactic development of children

Indices used in early investigations:

Early studies investigating the syntactic development of children done between 1920 and 1950 include those by Stormzand and O'Shea (1924), Boyd (1927), Symonds and Daringer (1930), LaBrant (1933), Anderson (1937), Davis (1937), Bear (1939), Heider and Heider (1940), Davis (1941), Watts (1948). These investigators either tabulated the frequency of occurrences of various parts of speech or types of sentences--simple, compound, complex--or they studied sentence length or clause length, and types of subordiante clauses and their ratios to each other and to main clauses. Among these studies, LaBrant's work is the most influential because her findings have helped to establish what has been called the "standard procedures" (Hunt, 1965, p.14).

LaBrant's study

LaBrant studied the writing of 482 pupils in grades four to

nine and 504 pupils in grades ten to twelve. The writing by all students was done within a given time in response to a given stimulus. She also compared these samples to the writing of eminent psychologists.

Observing that punctuation and coordination might influence sentence length, she focused her analysis of the writing samples on the clause. Her principal tests were clause length and the subordination ratio which she defined as the ratio of dependent clauses to all clauses.

LaBrant counted clauses simply by observing predicating expressions; but since coordinated verbs and "predicates containing two or more participles or complementary infinitives after a single auxiliary were counted as two predicates" (p.411), her procedure greatly reduced the length of clauses. Therefore, despite her observation that eminent psychologists wrote clauses that were twice as long as those written by school children, she concluded, "Apparently length of clause is not a significant measure of language development for children in Grades 4 to 12, inclusive" (pp.467-468).

Concluding that clause length was not a useful tool for measuring language development, LaBrant concentrated on the subordination ratio and found this to increase with age. However, her attempt to relate this index to chronological and mental age was confined to children in grades four to nine; therefore, the question remained as to whether this index could sufficiently differentiate the language of older children.

Despite certain limitations in her work, researchers before

the sixties were influenced by her findings and adopted the following three measures to trace language development: 1) mean sentence length, 2) subordination ratio and 3) the number and kinds of subordiante clauses. These are what Hunt referred to as the "standard procedures."

These early language development studies and others have been critically reviewed by McCarthy (1954), Carroll (1960), Ervin and Miller (1963), Hunt (1965, 1970a) and O'Donnell et al. (1969).

Indices developed in the sixties:

The early studies provided some valuable information on the syntactic development of children, one such piece of information being that the mere tabulation of parts of speech would reveal little about language development. These studies also showed that the language of children undergoes such quantifiable changes over the years as the lengthening of their sentences. But in order for results across studies to be comparable, there was the need for a more standard unit of measurement. Such a need was especially apparent when mean sentence length was consistently adopted as a measure, and different researchers had different interpretations as to what constitutes a "sentence" (see O'Donnell et al., 1967, p.4).

The phonological unit

Perhaps it was this felt need that prompted a conference of linguistic specialists which was held at Indiana University in 1959 for the particular purpose of providing a uniform index of

measurement for their investigations. In the conference, researchers developed the "phonological unit." This unit relies on intonation patterns such as the contours of inflection, stress and pause for the purpose of segmenting oral language. They also developed a two-level analysis of syntax. The first concentrates on 1) "fixed slots" and the items that fill them, 2) types and positions of "movables" and 3) "sentence connectors," while the second level identifies the subordinate elements used in the fixed slots and movable units. Such procedures have been used in the research of Strickland (1962), Hocker (1963), Riling (1965) and Loban (1961, 1963, 1964, 1976). A summary of the findings made by these researchers (except Loban, 1976) can be found in O'Donnell et al. (1967).

The communication unit

Even though the phonological unit seems to be a better defined measure than the rather haphazard treatment of a "sentence," as Loban observed, this unit is nevertheless influenced by whether the subject uses coordination. Moreover, there is no guarantee that the subject will always conform to standard intonation patterns, e.g., dropping the voice and pausing at the end of a sentence. Therefore, in his study, Loban supplemented this measure with a second measure which he termed the "communication unit." Working with what Watts (1948) had described as a "natural linguistic unit," Loban defined the communication unit as "a group of words which cannot be further divided without the loss of their essential meaning" (Loban, 1963, p.6). General features of what comprises a

communication unit are grammatically independent clauses with any of their modifiers, or answers to questions such as a simple "yes" or "no." Loban asserted that segmentation of language using this second measure can be done syntactically, with the use of semantics as a reinforcer. Hence this method of segmentation greatly reduces the subjective interpretation that researchers may give to a sentence or a phonological unit.

In his thirteen-year longitudinal study, an intensive observation of the development of language abilities of students from kindergarten to grade twelve, Loban found a gradual elaboration of the children's language. Even the kindergarten subjects were capable of using the basic structural patterns in English, but only the older or the more able students showed dexterity in their substitution of word groups for single words, in the choice and arrangement of movable syntactic elements, in variety of nominals, and in strategies with predications. Accompanied with this elaboration in language was an increased ability to make abstraction and generalization, using the appropriate connectives to relate the different ideas. The greater elaboration of language and the increased ability to abstract and generalize were reflected in the increase in the total number of words, the number of communication units, and the average number of words in communication units in each succeeding year of measurement. One index in particular--mean number of words per communication unit--showed the most consistent growth over the thirteen years and also discriminated best among all the other indices between students of high

language ability and students of low language ability.

However, even though the communication unit was a more objective measure than any other measure developed during the sixties, it had not been widely adopted in other research. One reason is that in the early monographs, Loban reported his findings with reference to ability groupings and not to age. It is another measure, the T-unit, which is in many aspects similar to the communication unit, that has become the standard measurement used in syntactic development research.

The T-unit

At the same time that Loban published his early reports, Hunt conducted a study the purpose of which was:

> 1) to provide, for the quantitative study of grammatical (syntactic) structure, a method or procedure which is coherent, systematic, broad, yet capable of refinement to accommodate details,
>
> 2) to search for developmental trends in the frequency of various grammatical structures written by students of average IQ in the fourth, eighth, and twelfth grades (Hunt, 1965, p.1).

Hunt collected writing samples from school children in the three grades as well as from skilled writers who had published in Harper's and The Atlantic. He analyzed the writing using different measures such as sentence length, clause length, and the ratio of subordinate clauses to main clauses. However, he found that none of these was satisfactory because there was considerable overlapping across grades. Sentence length was especially unreliable because young children may prolong their sentences considerably through the indiscriminate use of coordination or poor punctuation. Finally, he postulated a new

unit of measure called the T-unit. A T-unit is one main clause plus any subordinate clauses or non-clausal elements attached to, or embedded in, it. In his study, Hunt found a steady, statistically significant increase in the mean length of T-units from grade level to grade level, and inspection of individual ranges on this measure showed less overlapping among groups than on any of the other measures explored. Thus he concluded that mean T-unit length was the best indicator of a student's grade level. The second best indicator was mean clause length. Third best was the subordination ratio and the poorest was sentence length.

Through a detailed analysis of the strategies that the school children actually used to lengthen their T-units, Hunt explained why the T-unit was a good index of syntactic maturity (maturity is defined by Hunt as the observed characteristics of writing done by children at a higher grade). T-units are lengthened in two ways. One way is through the addition of subordinate clauses. The other is by increasing the number of non-clausal optional elements that are added to the minimal essentials of the clause such as a subject and a finite verb. However, stylistic considerations limit a greatly expanded use of the subordinate clause addition. The only other way to achieve substantial lengthening is by reducing sentences or clauses into non-clausal elements and embedding or attaching them to other clauses. As evidenced from the writing of the skilled writers, "the increased succinctness and economy which come with the reducing of clauses (or sentences or T-units) to

non-clausal structures" are the hallmarks of mature writers (p.145).

The claim made by Hunt that the T-unit is a valid measure of syntactic maturity is borne out by later studies, most notably by O'Donnell et al. (1967) and Hunt (1970a). In their study of the speech and writing of kindergarten and elementary school children in response to a given stimulus, O'Donnell et al. found that children in the higher grades produced significantly longer T-units in both speech and writing than children in the lower grades. They also found that this increase in T-unit length correlated highly with the number of sentence combining transformations per T-unit.

In his later study, Hunt made use of a rewriting passage called the 'Aluminum passage' which consisted of short kernal sentences each expressing a single proposition. High school students at three grade levels as well as average adult and skilled adult writers were asked to rewrite the passage in a better way using these kernal sentences as the sole input for the content. By calculating the ratio of the total number of kernal sentences to the total number of T-units produced by the different groups of writers, Hunt was able to compare the level of clausal and non-clausal embedding performed by the differnt groups. He postulated earlier (Hunt, 1965) that the ability to compress more 'thoughts' into the T-units distinguished mature writing from immature writing. Analysis of the writing sample based on the 'Aluminum passage' showed that indeed the more mature writers wrote fewer but longer T-units marked by a deeper

level of clause embedding than immature writers.

Other investigators corroborating the validity of the T-unit as an index of syntactic growth include Blount et al. (1968), Braun and Klassen (1973) and Stewart (1978).

Other indices developed in the seventies:

The T-unit, though proven by these studies to be a valid measure of syntactic growth, is nevertheless a gross measure. Although increased T-unit length correlates with an increased number of sentence combining transformations, it does not discriminate what types of transformations are being used. Therefore, some researchers have attempted to devise other measures that will be as effective as the T-unit, but more discriminating of the degree of complexity in the language sample.

Endicott's scale

One such index was developed by Endicott (1973). He advanced a theoretical model that combines syntactic analysis with morphemic analysis. Sentences that have undergone transformations receive a greater weight than sentences that have not, and words that are derived from base morphemes (e.g., productivity, from "product" plus "ive" and "ity") similarly receive a greater weight than base morphemes. Endicott claims that his model has a psycholinguistic basis.

This model has certainly taken more into account than the T-unit analysis, but as O'Donnell (1976) criticized, complexity

is not determined merely by the number of transformational processes involved in deriving the surface form from the deep structure, nor is the complexity of a word determined merely by the number of morphemes it contains. Therefore, the weighting is to a certain extent arbitrary and it cannot compare to the T-unit in terms of ease of scoring. And in order for the scale to be applicable in language research, it needs to be further expanded and tested for its validity in measuring language growth. But so far, no such work has been done.

The syntactic density score

Another index was developed by Golub and Kidder (1974). They isolated sixty-three syntactic structures from the writing samples of school children and subjected these to multivariate analysis to determine which ones would best predict high, medium, or low rating by teachers of the written discourse as a whole. They finally identified ten structures that correlated significantly with teachers' judgments. Through a process of canonical correlation analysis, they assigned relative weights to each structure according to its contribution to a factor named "syntactic density."

The scale, though statistically sound, is not without its weakness. O'Donnell (1976) observed that the ten items included have a high degree of redundancy in what they measure, with one item affecting the other (e.g., number of clauses per T-unit and number of words per clause would affect the T-unit length, while the number of gerunds, participles and unbound modifiers would affect clause length). He attributed the high correlation he

found between the syntactic density scores and words per T-unit in his analysis of a writing sample to this redundancy.

Belanger (1978) has also observed that the score would be affected by the number of T-units that are analyzed. This is because Golub and Kidder have lumped together T-unit length, main and subordinate clause length and subordinate clauses per T-unit, average measures unaffected by the length of the language sample, with occurrences of modals, gerunds, participles, etc., raw scores that are likely to be more frequent in longer samples. However, even when this mathematical anomoly has been corrected, the occurrences of the latter group of items are still affected by subject matter or individual writing style which in turn will affect the score, a fact pointed out by O'Donnell (1976).

Other indices developed include the syntactic complexity score by Botel and Granowsky (1972) and sentence weights by DiStefans and Howie (1979). These two measures are basically syntactic in nature, giving different weights to sentences or T-units according to their depth of embeddings. However, as far as the syntactic aspect is concerned and as far as the language sample used is fairly large and extended, the T-unit has been proved to be as effective as any of these measures, but is superior to any of them in its ease of scoring. Therefore, it remains the most widely adopted measure in language investigations.

B. A transformational analysis of grammatical structures

Besides finding means to trace the syntactic development of children, researchers in the sixties were also interested in finding out how the grammatical structures that children use develop over the years. As O'Donnell et al. (1967) suggested, the isolation of 'growth buds' (p.24) in the language sample of children would have tremendous pedagogical implications because attempts to speed up syntactic growth could use these 'growth buds' as starting points. Analysis of the grammatical structures in the language sample of children was especially popular in the sixties when the development of transformational grammar was at its zenith.

Among the pioneer studies using transformational grammar to analyze the oral and written language samples produced by school students are Hunt (1965, 1970a), Bateman and Zidonis (1966) and O'Donnell et al. (1967).

Hunt's study

In his early study, Hunt isolated thirty-six factors that accounted for significant differences in the writing among students at three different grade levels. But among these thirty-six factors, structures that showed an increase with a higher grade are mostly structures that involved embedding of non-clausal elements, especially embeddings producing nominal constructions. Of the kinds of subordinate clauses investigated, only adjective clauses increased with a higher grade. Noun clauses were found to be affected by subject

matter, and adverb clauses did not increase significantly because even though the variety of adverb clauses was more restrictive for the lower grade students, they produced as many adverb clauses as upper grade students did.

In the 1970 study using the rewriting passage as a testing instrument, Hunt found that reduction to less than a predicate (i.e., embeddings involving deletion) accounts significantly for the differences in writing among the different groups, as well as between the high third and the low third students within the same grade. A second finding in Hunt's (1970a) study that confirms his earlier results is that the adjective clause is a significant factor accounting for the increase in T-unit length. Another interesting finding in this study is that there is a set of kernal sentences that are consistently retained as main clauses in the rewriting by all the writers, and that certain kernals are consistently subjected to a certain kind of transformations, showing that certain constraints (such as rhetorical considerations) govern the transformational process.

The Bateman-Zidonis study

The principal concern of the Bateman-Zidonis study (1966) was to find out the effect of transformational-generative grammar on improving the students' ability to employ mature sentence structures. To test their hypothesis, the researchers devised a "structural complexity score" for each sentence based on the number of transformations it contained from a list of fifty-four transformational rules. These transformations can be divided into four main groups: 1) embedding transformations

which include noun expansion, noun replacement, adjective expansion, verb expansion, adverbial expansion and adverbial replacement; 2) conjoining transformations which involve coordination of main clauses; 3) deleting transformations which include coordination of subjects and predicates, deletion of the relative pronoun and the copula be in adjective clauses and adverbial embedment deletion; 4) simple transformations which include the formation of passives, questions, negatives and extrapositions. The researchers provided a rather exhaustive list of transformational rules that are used to derive surface structures from deep structures. However, later researchers (e.g., Mellon, 1969) have suggested that such a scheme be simplified (e.g., deleting the simple transformations and conjoining transformations from the list) since the study by Hunt suggested that sentence embedding and sentence deletion transformations accounted more for mature writing.

The O'Donnell et al. study

The study by O'Donnell et al. (1967) concentrated on sentence combining transformations. They classified these transformations under three headings: 1) those producing nominal constructions, 2) those producing adverbial constructions and 3) those producing coordinate constructions within T-units. Adjectival constituents of sentences were included as parts of nominal constructions. When elements such as clauses or infinitives modified adjectives, they were counted as adverbials.

In a separate analysis, the researchers also investigated

the grammatical functions of each of the transformed structures as well as the structural patterns of the main clauses in the speech and writing samples, but they did not find these to be useful in differentiating growth. The structures they found to be used more by older students are noun modification by a participle or participial phrase, the gerund phrase, the adverbial infinitive, the sentence adverbial, the coordinate predicate, and the transformation-produced nominal functioning as the object of a preposition.

Their scheme that analyzes sentence combining transformations is an improvement over the Hunt (1965) and Bateman and Zidonis (1966) studies because it is more compressed. Its emphasis on the nominal constructions takes Hunt's findings into account because Hunt concluded that the nominal strcutures are most indicative of language growth.

Later researchers adopted such a scheme for their analysis of language. These researchers include Thornhill (1969), Cooper (1976), Pope (1978) and Gebhard (1978). The language samples analyzed include both first and second language data and speech and writing, as well as language samples produced by students at various stages of development (from kindergarten to elementary school to high school to university level). These studies suggest that the scheme is promising for use with a wide variety of language samples. The present study also adopted this scheme to isolate various structures used by students at the various grade levels.

C. The T-unit and its relation to language growth

Researchers using the T-unit analysis for their investigations of children's language at different points of growth have consistently found an increase in the T-unit with higher grade levels. This finding has led them to suggest that the T-unit is an accurate index for syntactic development. A question then arises: why is an external measure such as the T-unit, which is a mere count of the surface form, capable of reflecting syntactic growth, which is in turn a part of the growth in mental, psychological and behavioral processes?

O'Donnell et al. (1967) have pointed out that the T-unit correlates highly with the mean number of sentence combining transformations per T-unit. The latter measure is indicative of growth because:

> Except for coordination of main clauses, sentence combining transformations may be conceived as embedding one kernal sentence (often, though not always, in reduced form) into another in ways determined by the rules of grammar. This embedding increases the information carrying power of the resulting construction. It may well be supposed then, that at least for children, the relative density of these transformations within T-unit signalizes the degree of maturity attained (p.50).

A similar argument is found in Hunt's earlier study (Hunt, 1965). However, in his later study (Hunt, 1970a) and in another article (Hunt, 1970b), Hunt also explained the relation of mean T-unit length to language growth from a psychological standpoint. He pointed out that when mature writers lengthen their sentences, they do not do so linearly but hierarchically. A hierarchical arrangement makes explicit the interrelations

between the kernal sentneces. In so doing, the mature writers ease the reader's burden of interpreting the interrelations. In other words, when mature writers write, they have the readers in mind. On the other hand, through the process of embedding, mature writers subsume within a single chunk of language other recoded chunks. This enables them to process more information than an immature writer can. These two operations are clearly manifestations of a mature mind.

A more comprehensive account of the psycholinguistic relationship between the surface form and the cognitive processes of the writer was provided by Kerek (1981). He pointed out that the writer's choice of syntax is governed by three major types of constraints: developmental, linguistic and rhetorical. For young writers, the development constraint tends to offset the rhetorical constraint so that they produce texts that take little account of audience or purpose. Developmental constraints such as the available conceptual capacity, short-term memory, temporal memory span, etc., also affect their linguistic choices. Many of the syntactic types found frequently in the speech or writing of young children (as reported by Hunt, 1965 and O'Donnell et at., 1967) are direct manifestations of the developmental constraint. Because young writers cannot hold a long stretch of language in their heads, they write sentences that are typically short (Hunt found that fourth graders wrote T-units that were mostly under nine words). They use coordination to express a relationship between two sentences unless it is a temporal relation. They front main

clauses and use underived nouns as subjects, an operation called "nominal seizing" (Ertle, 1977), which is typical of young children's egocentrism. They express syntactic and semantic relations on a one-to-one basis because this provides the maximum semantic closure and is the least straining on their memory. It is only when they mature, when they have grown in their cognitive abilities, that they can produce more complex syntax such as syntax that involves the use of deletion transformations.

Mellon (1979), on the other hand, sees the growth in syntactic maturity as a result of the growth in two aspects: 1) growth in the students' cognitive and conceptual abilities and 2) growth in the skills of the students as writers. Growth in the first aspect is manifested chiefly in the complexity of what he calls 'dominant noun phrases (NP's),' i.e., NP's that are expanded through the use of restrictive relative clauses and relative clause reductions, or NP's that consist of an abstractive verbal noun plus whichever of its deep structure subjects, objects, and complements that may be retained, or sentential nominalization in clausal or verbal-phrase form. He explains how the students' conceptual development affects the use of these NP's in their writing:

> ...as young persons' conceptual knowledge grows broader in scope and richer in structure, this growth causes them to see more things interrelated in more complex detail. The process of composing thought into written language moves from conception to construction to inscription, and the structure of the product directly mirrors that initial conception. As a result, the names persons make, first to represent and then to say what they see, necessarily grow more complex in content and therefore also in form, with the passing of time. In other words, that part of syntactic-fluency growth

> attributable to increasing elaboratedness in the grammatically restrictive structure of dominant NP's is a direct and unavoidable consequence of the development of conceptual knowledge (p.18).

Mellon's observation is partly confirmed by Hunt's (1965) finding that grade 12 students used significantly more and longer complex NP's (analyzed by the number of sentence-combining transformations involved in deriving the nominals) than students at grade 8 and grade 4 did.

Another aspect of growth is the growth in skills as writers. As the students grow in their abilities as writers (through practice in writing), they learn to introduce "nonrestrictive secondary statements into primary statements" through the use of such operations as:

> ....predicate-phrase conjoining, participial and gerundive conjoining in categories usually labeled adverbial, conjoining in nominative-absolute form, the logical conjoining of whole sentences, and the conjoining of minor sentences reduced in form to nonrestrictive relative clauses, nonrestrictive appositive phrases, and so on (Mellon, 1979, p.20).

Mellon suggests that investigations that look into language development ought to examime separately the two sources that contribute to the growth in syntactic maturity as growth in the first aspect would be relatively unaffected by external influence (such as the effects of instruction) while growth in the second aspect is amenable to techniques such as sentence combining.

However, these theoretical conjectures need to be proven. Hunt (1970b) suggested that it was possible (though he thought it highly unlikely) that the longer and more complex sentences produced by older children were just imitations of what they

read in books. In other words, the complex sentences are stylistic imitations, and not developmental trends. Hunt (1970b) speculated that if it can proved that native speakers and writers of other languages, particularly non-European languages, show similar developmental trends (i.e., using more complex syntax at an older age) then there is support that the complex syntax is a psychological and behavioral reality. He also raised the question of whether someone learning a second language as an adult will show a rate of development in the second language as slow as it was in the first, or whether it happens instead that the mature ability developed in the first language is quickly applied to the second as soon as he has internalized the new rules and the new vocabulary.

D. T-unit related measures in other native language and second language investigations

There is now preliminary evidence that an increased ability to produce more complex syntax as one becomes older is a universal trend. In one article (Hunt, 1977), Hunt cited the study by Reesink et al. (1971) who translated the 'Aluminum passage' into Dutch and applied it to Dutch children. The study demonstrated that "the similarity between Dutch and American children in syntactic development is outstanding." He also cited his own investigation at the East West Centre in applying the rewriting passage to speakers of Pacific Island languages

and some Asian languages. The rewriting passage was translated into these languages to be rewritten by children aged about 9, 13, and 17 who were native speakers of the language tested. The initial findings showed that the number of words per T-unit correlates with the age group in at least five of the languages being investigated.

Similar studies have been conducted with second language learners. Thornhill (1969) studied the developmental sequence of syntax by four Spanish adults studying English as a second language. Using the T-unit measure and a transformational analysis of grammatical structures, he demonstrated that these are valid measures of second language learners' growth in the control of English syntax. He also concluded that developmental stages in second language acquisition do exist and that these stages are similar to those through which native language learners progress.

Two other studies confirming the validity of the T-unit for measuring growth in second language learners were done by Cooper (1976) and Monroe (1975). Cooper analyzed free writing done by four levels of American university students learning German as a second language and a group of native German speakers. Four of the five measures he employed--clause length, subordination ratio, T-unit length, and sentence length--detected significant differences between groups. The remaining measure, the coordination ratio between main clauses, failed to detect any significant difference between groups. (This finding is consistent with Hunt's conclusion that

coordination between main clauses is an immature writing trait.) He also did a transformational analysis (based on the scheme of O'Donnell et al.) of the structures employed by the students. Of these, nominal structures and coordinated structures within T-units are better able to differentiate among the four levels of students than adverbial structures or dependent infinitives. He drew the conclusion that developmental stages in the acquisition of German syntax do exist and that these stages are most clearly definable between every other level.

Monroe made use of a rewriting passage to analyze the syntactic growth of American university students learning French as a second language. He also compared the rate of growth with that of native French speakers. Like Cooper, he found that students at a higher level wrote longer sentences, longer T-units and longer clauses. They used more subordinations and performed more non-clausal embeddings. The mean difference for all the five factors was significant between non-adjacent groups. He concluded that these students learning French as a second language go through developmental stages that are similar to the stages found in native English speakers. He also showed that the T-unit measure combined with the use of a rewriting passage is a reliable and objective instrument for measuring the syntactic development of American students of French.

A modified form of the T-unit in second language research

Some researchers (e.g., Scott and Tucker, 1974; Gaies, 1976; Larsen-Freeman and Strom, 1977; Vann, 1978 and Sharma, 1979) suggested or used a modified form of the T-unit in their

investigation of second language data. Instead of merely counting T-unit length, they counted the length of error-free T-units and the proportion of these error-free T-units to the total number of T-units. As Gaies (1976) argues, a study of structural errors in sentences may reveal as much about the students' control of syntax as a study of the length of sentences. Although some of these researchers did find the number of error free T-units correlating with the degree of langauge proficiency (as measured in most cases by TOEFL scores), this researcher did not feel that a modification of the T-unit was warranted. One difference between these studies reviewed above and the current study is that they all measure the relation of syntactic control to language proficiency, not stages in second language learning. Objective tests such as TOEFL usually assume a fairly advanced level of second language learning, and they are often used as a criterion measure for non-native speakers for admission to universities where English is the medium of instruction. Moreover, these tests usually measure a student's knowledge of grammar and usage, and if such a criterion is used for differentiating the proficiency levels, any instruments that incorporate a measure of errors would undoubtedly correlate highly with the proficiency levels. However, if one's concern is syntactic strategies exhibited by the learners at different stages of second language learning, then the tabulation of errors will not be a revealing measure because when a learner expands his language use, he will have more chances of making errors than a learner whose language is

in itself limited. In a later article, Gaies (1980) also raises some questions about the introduction of an error measure into the T-unit analysis. He notes that researchers do not have concensus on what should or should not be included as errors. And even if there were concensus, there would still remain the question of whether or not it would be worthwhile to establish a hierarchy of errors, since different errors clearly have different effects.

E. The applications and the limitations of the T-unit

It seems profitable now to sum up the applications of the T-unit and its limitations as an index of syntactic growth. When it was first developed by Hunt, it was intended to be a measure that would reflect syntactic development in school children. It was found to be better able to differentiate among students at different grade levels than clause length, the subordination ratio or sentence length. It can also be inferred from the Loban study that to reflect language growth, perhaps a syntactic measure (such as the T-unit or clause length) is more objective and more effective than measures that investigate other aspects of language development as he found that the communication unit was the most effective index to trace the development of language control in the students over the thirteen years.

However, it is important to note that a syntactic measure reflects language growth from a syntactic perspective. Even

though researchers have speculated that growth in syntactic abilities is very much related to cognitive and psychological growth, the growth is not language development itself. It does not take into account other aspects of language growth, such as development in vocabulary. It is limited to a sentence level analysis: larger discourse concerns such as coherence and organization of ideas cannot be measured by looking at individual sentences. But despite its limitations, in view of the fact that no other measure can compare with the T-unit in its economy and that no other measure has such proven efficacy in differentiating the language of students at different grade levels as the T-unit, it remains the most effective tool in large-scale language investigation. It has also been proved by at least two studies to be useful in investigating second language development.

Caution in interpreting data analyzed by the T-unit

Nevertheless, when interpreting language data analyzed by means of the T-unit, one must be cautious not to over-interpret the data. As Crowhurst (1979) notes:

> ... mature and able writers have at their disposal greater syntactic resources than do less mature, less able writers. These resources they use to a greater or lesser extent according to the demands of the writing tasks. Over a substantial body of writing, these greater syntactic resources are manifested in a higher average level of syntactic complexity than is the case for younger or less able writers (p.96).

Implicit in this comment is that the T-unit measures group traits, not individual traits, and that it reflects language growth better with an extended language sample than a single writing. Therefore, it would be misleading to use the T-unit to

compare the syntactic development of individual students and to base the conclusion on a limited language sample.

One must also bear in mind that the T-unit differentiates between groups at different stages of language development, and not groups at different proficiency levels. Nor is mean T-unit length a major contributing factor to writing quality. As has been demonstrated by researchers (such as Veal, 1974; Gebhard, 1978; Stewart and Grobe, 1979), writing quality is dependent upon ideas, coherence, organization, word choice and usage, in addition to syntax. Crowhurst (1979) warns against viewing language complexity (manifested by longer T-units) as equated with mature writing.

Another problem associated with the interpretation of T-unit data is to regard established data (such as the findings of Hunt) as developmental norms. Crowhurst and Piche (1979) have shown that there is a greater variation in T-unit length across different modes of discourse than between students at two different grade levels. They also found that narration tends to elicit shorter T-units than argument, and that for narration, T-units cease to increase in length beyond a certain grade. They argue that unless the mode of writing is specified, different writing samples will produce different "norms." They also suggest that since argument makes the greatest demand on a writer's linguistic resources, language development research should make use of this discourse mode to elicit writing samples. That the T-unit analysis is affected by the writing task is discussed in more detail in Section F.

Other researchers have also shown that socioeconomic status has certain effects on children's syntactic development. The study by Loban (1976) is a good example. The low ability students (coming exclusively from a lower socioeconomic stratum than the high ability students) consistently lagged behind the high ability group on all of the indices of language growth. The study by Conway (1971) which is a replication of the O'Donnell et al. study but uses Ohama Indian children as subjects also shows that these children have a slower rate of growth than their Caucasian counterparts who come from a middle or upper-middle socioeconomic stratum.

On the other hand, the claim made by some researchers that the T-unit is a valid measure in second language research and the claim that second language learners go through similar developmental stages in syntactic growth as native speakers need to be further substantiated. The studies by Cooper (1976) and Monroe (1975), though confirming the two claims, involve college level students learning second languages that are not so different from their first lanugage (i.e., both the native and foreign languages belong to the Indo-European family). Thornhill's study (1969) lacks generalizability because it involves only four subjects. Other studies involving ESL learners coming from a variety of language backgrounds are marked with the one flaw that they differentiate the students by proficiency levels, thereby introducing an extra factor into the investigation of syntactic development. To provide better evidence for the two claims than that provided so far, further

research in the syntactic development of second language learners should use subjects with a non-European native language background in age comparable to the subjects used in the Hunt study. This is the objective of the current study.

F. Effects of discourse on the T-unit analysis

Researchers have long been aware that the kinds of syntactic structures produced are dependent upon the writing task for which the syntactic structures are used. Therefore, researchers have tried to control this variable by using a uniform stimulus to elicit the speech or writing sample from different groups of students (e.g., LaBrant, 1933; O'Donnell et al., 1967). In his early study (Hunt, 1965), Hunt did not control the writing task across different grade levels. Instead, he relied on a large writing sample (1000 words per student) to cancel out individual variations. However, he too was aware that subject matter had a significant effect on the syntactic structures produced. Therefore, in his later study, he strived to control this variable not only by specifying the subject matter, but supplying the content as well (he asked all subjects to rewrite the same passage).

The effect of the writing task on syntactic maturity was investigated by a number of researchers. Rosen (1969) asked the same group of students to write on eight different topics, each topic eliciting a different kind of writing. He found that the students produced the longest T-units in argumentation: the

T-unit length in this mode of writing was almost four words longer than the T-unit length in narration.

San Jose (1972) investigated the effect of different discourse modes on the writing of fourth-grade students. She found that students wrote longer T-units in the argumentative and expository modes than in the narrative and descriptive modes. The scores on mean T-unit length for the four modes of writing were respectively 10.4, 9.9, 8.7 and 8.4. Perron (1976) found the same trend with fifth-graders whose mean scores on T-unit length in argumentation were almost three words longer than their scores in narration.

Crowhurst and Piche (1979) studied the writing of sixth- and tenth-graders in three modes of writing: narration, description and argumentation. The tenth-grade students wrote almost four words more per T-unit in argumentation than in narration. There was also a significant difference in T-unit length on the sixth-grade assignments between the two modes of writing, although the contrast was not as marked as that of the tenth-graders. On the other hand, in narration, there were no significant differences on any of the syntactic measures between the two grades, although the tenth-graders were supposed to be four years more 'mature' than the sixth-graders. Therefore, they questioned the propriety of regarding established data (such as the findings of Hunt) as developmental norms when mode exerted a greater effect on syntactic complexity than grade levels. They also found that audience had an effect on the syntactic measures, with longer T-units being produced in

assignments written for 'teacher' than for 'best friend.'

Partially replicating her 1979 study, Crowhurst (1980) studied the effect of discourse mode on syntactic complexity on three grade levels: sixth, tenth and twelfth. She found the same trend as the earlier study, i.e., syntactic complexity was greater in argumentation than in narration. The only deviation from the earlier study was that whereas she found no significant differences in syntactic complexity between the tenth graders and sixth graders in narration in the earlier study, in this later study, she found that there was a significant difference. However, that there was not a significant difference between grade ten and twelve lent some support to the suggestion made in the earlier study that in narration, age related syntactic complexity may stop at a certain age point.

All these studies support the claim that the syntactic structures produced by the students are affected by the writing task they are required to do. Moreover, the argumentative or expository assignment tends to elicit higher level of syntactic complexity from students than a narrative or descriptive assignment. These studies, however, are all based on first language data. Whether second language learners will exhibit such differentiation in the syntactic structures they employ in response to different writing tasks is a question to be answered by this study.

G. Summary

Researchers' attempts to isolate an index to trace syntactic development have resulted in the establishment of the T-unit, a measure developed by Hunt (1965). Though a gross measure as it involves a mere count of words, the T-unit has nevertheless been shown by various studies to be able to reflect the maturity of language of students at various grade levels. Researchers have also developed various schemes to analyze the development of grammatical structures from immature to mature speakers or writers, among which the scheme developed by O'Donnell et al. (1967) is the most widely adopted in research.

Some researchers tried to provide explanations from a psycholinguistic viewpoint about the relation of the T-unit to language growth, and their conjectures were to a certain extent borne out by studies conducted with native speakers of languages other than English and with second language learners who showed a similar increase in T-unit length with age.

However, the limitation of the T-unit is that it reflects group performance and is not useful for assessing an individual student's syntactic development. It is also found to be affected by a number of factors, most notably the mode of writing. However, when mode differences have been taken into account, the T-unit has been found to be an economical and accurate measure for large scale language investigation.

CHAPTER THREE

RESEARCH DESIGN AND PROCEDURES

A. The subjects of the study

The subjects were Chinese secondary school students learning English as a second language in Hong Kong. The decision to use ESL subjects in Hong Kong was based on two considerations: 1) since the study concerned growth in syntactic maturity, it seemed more reasonable to group subjects according to age and the level in ESL learning as indicated by their grade levels rather than to group them by scores on objective tests which measure knowledge of usage and grammar. Groups differentiated in such a way are easy to obtain in Hong Kong but difficult in Vancouver; 2) the subjects chosen in Hong Kong are homogeneous in the sense that they all have the same native language background (Chinese) and they all learn English as a school subject; therefore, the conditions for learning the second language are very uniform for all the subjects. This homogenity was appropriate to this study which measured skill across the three groups because each group would differ from the other only in terms of age and the level of second language learning. The findings, then, would not be confounded by the variation in the amount of exposure to the second language that each subject had.

All subjects were studying in Hoi Ping Secondary School, a

school with a uniform Chinese student population coming from a lower-middle or low socioeconomic background (as evidenced from the fact that over 50 percent of the students in the school receive subsidy from the government for fee payment because of low family income). Despite the socioeconomic background, the academic ability of these students was above average (explained in Chapter 1). The school has English as one school subject among others, but starting in F.3, English is also used in the other subjects as the medium of instruction.

The subjects were studying in F.3, F.5 and F.7 (in Canada this would be roughly equivalent to grade 9, grade 11 and grade 13). Twenty subjects each were randomly chosen from two intact classes (with 30 to 40 students in a class). The distribution of sexes and the range and mean age for the students in each grade are shown in Table 1 and Table 2.

Table 1: Distribution of Sexes by Grade Level

Grade	F.3	F.5	F.7
Male	8	9	11
Female	12	11	9

Table 2: Mean Age and Age Range for Students at the Three Grade Levels Studied

Grade	F.3	F.5	F.7
Mean Age	15:1	17:2	18:10
Age Range	13:11-17:4	15:10-19:2	17:11-20:11

Note:Age in years and months calculated as of Dec. 1982. Month numbers separated by a colon from year numbers.

English learning starts as early as at the kindergarten level in Hong Kong, but formal instruction in reading and writing English starts only in the secondary school when the students are about thirteen years old. However, it is only when they have reached F.3 that the students produce genuine compositions (compositions in the form of free writing as opposed to controlled writing done in the lower forms). This provides the basic reason for starting the investigation at the F.3 level.

B. Collection of the language samples

The research of Crowhurst and Piche (1979) indicated that there would be considerable variation in syntactic performance when students were writing in different modes or to different audiences. Hunt (1965) also indicated that certain syntactic structures were dependent upon subject matter. In the current research, the audience and subject matter variables were controlled by having students at the three grades write on the same subject matter to their teacher (see Appendix B for the composition topics). To investigate the influence of mode on their writing, the subjects wrote two compositions (one in response to a narrative assignment and the other to an expository assignment).

The students produced a written sample of about 200 words for the mode-wise comparisons and about 400 words for the grade-wise comparisons. O'Hare (1973) indicated that a sample

just over 400 words in length was as reliable an indicator of average T-unit length as a 1000 word sample was. But smaller sample sizes have also been used in other research (e.g., 300 words in Hunt and O'Donnell, 1970; and 300 words in Combs, 1976). The students wrote the two compositions in two separate 40-minute sessions at the end of the first school term (mid-December to early January). The actual writing was done in an examination setting with the students working on their own without help from the teachers or other students. However, although examination conditions are suitable for control purposes, it is also likely that students will not put forward their best performance so that the syntactic structures exhibited in the writing will not be representative of the full range of structures that they are capable of. To prevent this, various efforts were made in this research to elicit better writing performance from the students. The compositions for the analysis were photocopied and then graded by the students' teachers and returned to them, while the researcher kept the original copies. It was felt that the grading would increase students' incentive to write. Two topics were chosen which the researcher judged (through her experience in teaching similar subjects) to be equally manageable and challenging for the students at the three grades. The most important effort, however, was the devising of procedures that would help the students in the prewriting stage.

Modern composition research (especially Clifford, 1981) has indicated that the best instructional method to elicit good

writing performance from students is to help them to slow down and elongate the composing sequence described by Emig (1971). In this research, a special attempt was made to prolong the prewriting stage so that the students would have sufficient time to think about, and to gear themselves to, the writing. A series of prewriting procedures was designed to be administered by the teachers (see Appendix C). Since the researcher could not be present to explain the procedures, the rationale and the salient characteristics of each procedure were explained in a letter to the teachers (see Appendix D). To find out how the teachers had carried out the procedures, a writing log (see Appendix E) was given to teachers for them to indicate the duration of each session, the participation level of the students, and the ease of implementing the procedures. Response from the teachers indicated that the procedures were uniformly carried out at all three grade levels.

C. Measurement

The writing produced by the 20 students randomly selected at the three grade levels was subjected to a two-level analysis: 1) analysis of the average length of T-units, the average length of clauses and the number of clauses per T-unit; and, 2) analysis of the sentence combining transformations[2] used by the

[2] The term follows Hunt (1965) and O'Donnell et al. (1967). It is to be noted, however, that what is measured is not sentence combining transformation per se. Rather, the analysis counted occurrences of three types of grammatical structures (nominals, adverbials, and coordinations within a T-unit) produced as a result of sentence combining transformations.

students at each grade.

Before each composition was segmented into T-units, extraneous matter called 'garbles' was excluded. A 'garble' was defined by this researcher as any sentence, or part of a sentence, that is unintelligible. This researcher retained sentence fragments that resulted from non-standard usage (e.g., wrong punctuation, misused parts of speech, wrong prepositions, omissions, etc.,) as long as their semantic contents were clear, but deleted garbled sentences or garbled segments (see Ney and Fillerup, 1980) from the analysis. An account of how other researchers defined garbles is presented in Appendix F. Examples on this researcher's treatment of garbles are found in Appendix G.

After garbles or garbled segments were deleted, the two compositions were segmented into T-units and clauses. Then the average T-unit length and clause length, as well as the number of clauses per T-unit, were calculated.

Following Hunt (1970a), a T-unit was defined as one main clause plus any subordinate clauses or non-clausal elements attached to, or embedded in, it.

Again, following Hunt (1970a, pp.13-14):

> [t]he criterion used to decide whether a certain expression was to be counted as a clause was the same as that which appears in most schoolbook grammars: the expression must contain a subject (or coordinated subjects) and must contain a finite verb (or coordinated verbs).

Mean T-unit length was calculated by dividing the total number of words by the total number of T-units. Mean clause length was calculated by dividing the total number of words by

the total number of clauses. The number of clauses per T-unit was calculated by dividing the total number of clauses by the total number of T-units. The mean for each student in each composition on each measure was first obtained; then a grade mean was calculated by averaging the individual means.

Following O'Hare (1973, p.48) "speaker tags" were retained and counted as main clauses (or as subordinate clauses if they happened to serve a subordinate function). The first expression occurring in direct discourse was counted as a noun clause, while the rest were classified according to their functions within the direct discourse.

Clauses joined by coordinating conjunctions were counted as two T-units except when these clauses were already embedded in another clause. Following Quirk and Greenbaum (1973), a coordinating conjunction was defined as a link for two clauses without explicitly indicating subordination. The link would be located between two clauses and could not be moved to head the first clause without producing unacceptable sentences or at least changing the relationships of the clauses. For example, the first sentence would be acceptable in its use of the coordinating conjunction (underlined) but not the second:

> They are living in England <u>or</u> they are spending a vacation there.
> <u>Or</u> they are spending a vacation there, they are living in England.

Clauses joined by subordinating conjunctions were counted as one T-unit. Subordinating conjunctions were differentiated from coordinating conjunctions by the fact that they could be placed either at the beginning of the sentence or in the middle

between the two clauses, as in these examples:

Because she was tired, she went to bed.
She went to bed because she was tired.

'For' and 'so that' occurring somewhere on the gradient between the 'pure' coordinators and 'pure' subordinators were treated as subordinators.

Word count followed O'Donnell et al. (1967). Contractions such as "he'd" were regarded as two words. Compound nouns were given the count indicated by the number of bases involved, e.g., 'policeman' would be counted as two words.

The second level analysis involved analyzing the kinds of sentence combining transformations used by students at the three grade levels. Based on O'Donnell et al. (1967), all sentence combining transformations (excluding coordination of main clauses) were classified into three major categories according to their grammatical functions in the sentence: 1)nominals, 2) adverbials, and 3) coordinations within T-units. Within these three major categories, subcategories were identified according to types of structure and function.

Nominal constructions include all those structures that expand a single noun through the addition of adjectives, nouns, appositives, participles, infinitives and relative clauses or relative clause reductions. Included in this category are also constructions that are derived from verbs (such as gerunds or infinitives) but functioning as nouns, and clauses serving as subjects or objects. No distinction was made here between restrictive or non-restrictive relative clauses because an initial inspection of the sample revealed that the latter did

not occur frequently in the data. Nouns modified by an adverb or a post-noun adjective (e.g., something strange) were also omitted from the analysis because of their infrequent occurrences.

Adverbial constructions include all kinds of clauses modifying the verb in the main clause. These clauses were subdividied into two categories: 1) time clauses and 2) others (e.g., clauses of reason, result, concession, condition, etc.,). Such a distinction was made because of Hunt's finding that while younger and older writers produce approximately the same number of adverbial clauses, older writers distinguish themselves from the younger writers by using a greater variety of these clauses, while younger writers tended to use more time clauses. Clauses modifying an adjective are also classified into this category. Adverbial constructions also include the sub-category of infinitives that modify verbs or adjectives. Another subdivision is what O'Donnell et al. called sentence adverbials. These are characteristically movable elements not closely related to a single constituent. Examples of sentence adverbials are interjections, absolutes, sentence connectors and prepositional phrases modifying the main clause.

Coordinate constructions include coordination of nominal structures, modifiers, as well as coordinate predicates.

The scheme for the analysis with examples (some taken from O'Donnell et al.) is delineated below:

Nominal Constructions

1. Headed	
A. Noun+noun	school gate
B. Noun+adjective	cold rain
C. Noun+genitive form	man's coat or his coat
D. Noun+relative clause	man who was wearing a coat
E. Noun+appositive or appositive clause	Mr. Young, the principal, the fact that he drowned
F. Noun+prepositional phrase	bird in a tree
G. Noun+infinitive phrase	food to eat
H. Noun+participle or participial phrase	falling leaf or the ant rolling the ball
2. Non-headed	
A. Noun clause	The dove saw that the ant was drowning.
B. Infinitive phrase	He wanted to return the favor.
C. Infinitive with subject	The sun made the flower bloom.
D. Gerund or gerund phrase	Dancing is good exercise. She kept him from being drowned.

Adverbial Constructions

1. Adverbial clause	
A. Time	when he arrives
B. Others	He is glad that he comes.
	if I were you
	The more the merrier.
2. Sentence adverbial	
A. Interjection	He is wrong, I think.
B. Absolute	Feeling hungry, he ate.
C. Prepositional phrase	Without saying a word, he went away.
D. Sentence connector	Surprisingly, he came.
	However, he did not take it.
E. Others	He only got four dollars, much less than the others.
3. Adverbial infinitive	He went to get some food.
	It is likely to rain.

Coordinate Constructions

1. Coordinate nominal	boys and girls
2. Coordinate modifier	fresh, white bread
	ran quickly and carefully
3. Coordinate predicate	he reads and writes

A sample analysis of two paragraphs written by students can be found in Appendix H. Instances of each type of transformationally-produced structure were tabulated and

converted into instances of such per 100 T-units. Then all occurrences within the same category were calculated and compared among the three grades and between the two modes of writing using ANOVA. Where there was a significant difference, a stepwise discriminant analysis was performed to decide which of the structures within the category accounted for the difference.

The T-unit and clause segmentation and the frequency count were performed by this researcher. To establish the reliability of scoring, a trained check-coder independently scored a 10 percent sample of the compositions on word count, number of T-units, number of clauses, number of gerunds, nouns modified by an adjective, adverbial clauses other than time and sentence absolute. Interscorer reliability, calculated by a Pearson product-moment coefficient, was 0.99, 0.99, 0.99, 0.95, 0.96, 0.88, and 1.0 on the above measures (the last score was accounted for by the fact that there were only three instances of this measure in the sub-sample).

D. Processing of the data

The first level analysis yielded scores on three dependent variables: mean number of words per T-unit (W/TU), mean number of words per clause (W/CL) and mean number of clauses per T-unit (CL/TU). Each variable was analyzed by a separate ANOVA in a 3 (grade) x 2 (mode) factorial design with a repeated measure on the second factor. Results were tested for significance at the

.05 level. For the planned pairwise comparisons across grades within the same mode, Bonferroni t-statistics (Kirk, 1968) was used. For pairwise comparisons across modes within the same grade, t-test for correlated measures (Glass and Stanley, 1970) was used as the two assignments were written by the same students and therefore the samples were not independent.

The second level analysis yielded scores on the occurrences of three types of grammatical structures. Each score was analyzed by ANOVA as described above. Then each factor within each grammatical type was analyzed by a stepwise discriminant analysis to decide which structure was more discriminating of the writing done by the students in the three grades and in the two modes of writing.[3] The greater part of the computation involved in the study was performed on the computer system at UBC using Program P2V: Analysis of Variance and Covariance with Repeated Measures and Program P7M: Stepwise Discriminant Analysis on the BMPD Statistical Software Package (Dixon, 1981). Newman-Keuls tests were conducted where necessary to clarify the nature of the more complex relationships.

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[3] The discriminant analysis is a statistical procedure for independent groups (e.g., students at different grade levels). Since the two compositions for the analysis of mode difference were produced by the same students, results thus obtained must be qualified to a certain extent. However, precedence for the use of this statistical procedure on dependent groups can be found in Clemens et al. (1970). For explanation of this statistical technique, reference can be found in Afifi and Azen (1979, pp.310-318).

CHAPTER FOUR

FINDINGS

To find out whether there were significant differneces on three syntactic measures and three types of grammatical structures across three grade levels and between two modes of writing, two compositions (one in response to a narrative assignment and one to an expository assignment) written by ESL students at F.3, F.5 and F.7 were collected and analyzed. The range and mean number of words (excluding garbles) written by the students at the three grade levels and in the two modes of writing are shown in Table 3. Although the students were encouraged to write as many words as they could, the majority of them wrote within the range of 180-250 words. They were conforming to the stipulated length of 200 words which they were usually instructed to write. In general, however, there was a greater variation in word length at F.7 than at F.3 and students also produced longer compositions at each higher grade level. A table of raw scores for number of words, number of T-units, number of clauses, and the instances of grammatical structures for individual students in each mode of writing is presented in Appendix I.

The compositions were subjected to a two-level analysis: 1) analysis of three synatctic measures--mean T-unit length, mean clause length, and mean number of clauses per T-unit; 2) analysis of three types of grammatical structures--nominals,

Table 3: Range and Mean Number of Words Written by Students at Three Grade Levels and in Two Modes of Writing

Mode	Grade F.3 Mean	F.3 Range	F.5 Mean	F.5 Range	F.7 Mean	F.7 Range
Narrative	201.0	148-267	236.0	187-305	238.4	145-428
Expository	186.8	109-292	218.9	157-295	229.3	154-337
Total Words per Student	387.8	310-559	454.9	365-550	467.7	358-671

adverbials, and coordinations within T-units--which were the result of sentence combining transformations. Twenty-seven null hypotheses were postulated (see Appendix A). After statistical analyses were conducted, twenty-one of these null hypotheses were rejected. In general, the findings confirmed the general hypothesis that there was a differentiation on the syntactic measures and the grammatical structures among grade levels and between the two modes of writing.

A. Differences on three syntactic measures across three grades and between two modes of writing

The first level analysis yielded scores on three syntactic measures--mean T-unit length, mean clause length, and mean number of clauses per T-unit. Mean scores on each measure for each grade level and for each mode of writing are shown in Table 4. As can be seen in Table 4, there was an increase on each measure with each successive grade level, and except for number

of clauses per T-unit at F.7, there was also an increase on these measures from the narrative to the expository assignment.

Table 4: Mean T-unit Length, Mean Clause Length, and Mean Number of Clauses per T-unit Written by Students at Three Grade Levels and in Two Modes of Writing

Measure	Grade	Mode				
		Narrative		Expository		Two Modes
		Mean	SD	Mean	SD	Mean
W/TU	F.3	9.00	1.49	11.04	2.06	10.02
	F.5	10.00	1.67	12.71	2.41	11.35
	F.7	11.48	1.92	15.64	3.61	13.56
	3 Forms combined	10.16		13.13		11.64
W/CL	F.3	7.16	1.07	7.93	1.30	7.54
	F.5	7.19	0.71	8.87	1.78	8.03
	F.7	7.57	0.93	10.40	1.80	8.98
	3 Forms combined	7.30		9.07		8.19
CL/TU	F.3	1.26	0.16	1.40	0.18	1.33
	F.5	1.38	0.14	1.45	0.27	1.42
	F.7	1.52	0.19	1.52	0.33	1.52
	3 Forms combined	1.39		1.46		1.42

To find out whether there were significant differences on these syntactic measures, each measure was analyzed by means of ANOVA in a 3 (grade) x 2 (mode) factorial design with a repeated measure on the second factor. The statistical results indicated that there were significant differences among grade levels on all three measures, and between the two modes in mean T-unit length and clause length.

Table 5: Analysis of Variance for T-unit Length among Three Grade Levels and between Two Modes of Writing; and Mean Change between Grade Levels in T-unit length

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio	2-Tail Prob.
Mean	16266.5	1	16266.5	2278.75	<0.0001
Grade	256.6	2	128.3	17.97	<0.0001
Within	406.9	57	7.1		
Mode	266.0	1	266.0	76.79	<0.0001
ModexGrade	23.5	2	11.7	3.39	0.0406
Within	197.4	57	3.5		

Mean Change

	df	$\bar{d}$
F.7 - F.3	57	3.54*
F.7 - F.5	57	2.21*
F.5 - F.3	57	1.33(NS)

*significant at the .05 level of confidence based on the Newman-Keuls test

Mean T-unit length

Table 5 shows the statistical result obtained on the T-unit measure from analysis of variance. Table 5 also shows the mean change across grade levels and the statistical decisions based on the Newman-Keuls test. As can be seen from the table, there was a significant difference in the mean number of words per T-unit across the three grades. The probability level of $p<0.0001$ means that there was an extremely low probability that differences as great as these between grade levels were caused by chance.

Post-hoc analysis through the use of the Newman-Keuls test was carried out to determine if there were significant

differences between adjacent grade levels. The test indicated that for adjacent grade levels, the significant difference was maintained only between F.5 and F.7; the difference between F.3 and F.5 was not great enough to be statistically significant.

Table 5 also shows that there was a significant difference on this measure between the two modes of writing. Again, the probability level of $p<0.0001$ shows that the difference on this measure was unlikely to have been caused by chance. An examination of the mean scores on this measure (Table 4) reveals that on the expository assignment, students wrote significantly longer T-units than they did on the narrative assignment. Null hypotheses Ho 1a and 3a, which postulated no differences across the three grades and between the two modes of writing, were thus rejected.

Table 5 also shows that there was a significant interaction between grade and mode. This interaction is illustrated in Figure 1. As can be seen in Figure 1 (and from the raw scores in Table 4), although there was an increase in each mode of writing at each higher grade level, the increase on the expository assignment between adjacent grades was much larger than the increase on the narrative assignment. This interaction effect between grade and mode was further confirmed when the writing done by the students at the three grades in each mode was examined separately and when the two modes of writing were examined within the same grade.

Mean clause length

Table 6 shows the statistical result obtained on the clause

Table 6: Analysis of Variance for Clause Length among Three Grade Levels and between Two Modes of Writing; and Mean Change between Grade Levels in Clause Length

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio	2-Tail Prob.
Mean	8042.9	1	8042.9	4283.45	<0.0001
Grade	42.9	2	21.4	11.41	<0.0001
Within	107.0	57	1.9		
Mode	92.9	1	92.9	55.74	<0.0001
ModexGrade	21.3	2	10.6	6.39	0.0031
Within	95.0	57	1.7		

Mean Change

	df	$\bar{d}$
F.7 - F.3	57	1.44*
F.7 - F.5	57	0.95*
F.5 - F.3	57	0.49(NS)

*significant at the .05 level of confidence based on the Newman-Keuls test

length measure from analysis of variance. Table 6 also shows the mean change across grade levels and the statistical decisions based on the Newman-Keuls test. As can be seen from Table 6, there was a significant difference in the mean number of words per clause across the three grades. As with the T-unit measure reported above, the probability level of $p<0.0001$ showed that it was unlikely that the difference occurred due to chance. Post-hoc analysis through the use of the Newman-Keuls test again indicated that like the T-unit measure, between adjacent grades, there was a significant difference between F.5 and F.7 but not between F.3 and F.5.

Table 6 also shows that there was a significant difference between the two modes of writing. Again, the probability level

of $p<0.0001$ showed that it was unlikely that the differences occurred due to chance. An examination of the raw data on this measure (Table 4) revealed that the students wrote longer clauses on the expository assignment than on the narrative assignment. Null hypotheses Ho 1b and 3b, which postulated no differences across grades and between modes, were both rejected.

As with the T-unit measure, there was a significant interaction between grade and mode. An examination of Figure 2 and the raw scores in Table 4 suggested that there was hardly any increase in this measure on the narrative assignment, while there was a substantial increase on the expository assignment, especially between F.5 and F.7.

Mean number of clauses per T-unit

Table 7 shows the statistical result obtained on the mean number of clauses per T-unit from analysis of variance. The table also shows the mean change across grade levels and the statistical decisions based on the Newman-Keuls test.

As Table 7 shows, there was a significant difference in the mean number of clauses per T-unit across the three grades. The probabilty level of $p=.0046$, though less significant than the previous two measures, still indicates that there were fewer than five chances in a hundred that the difference was caused by chance. Null hypothesis Ho 1c, which postulated no differences between grade levels, was thus rejected.

Unlike the previous two measures, post-hoc analysis through the use of the Newman-Keuls test revealed that there was not a significant difference between any adjacent grades because the

Figure 2: Mean Number of Words per Clause Written by Students at Three Grade Levels and in Two Modes of Writing

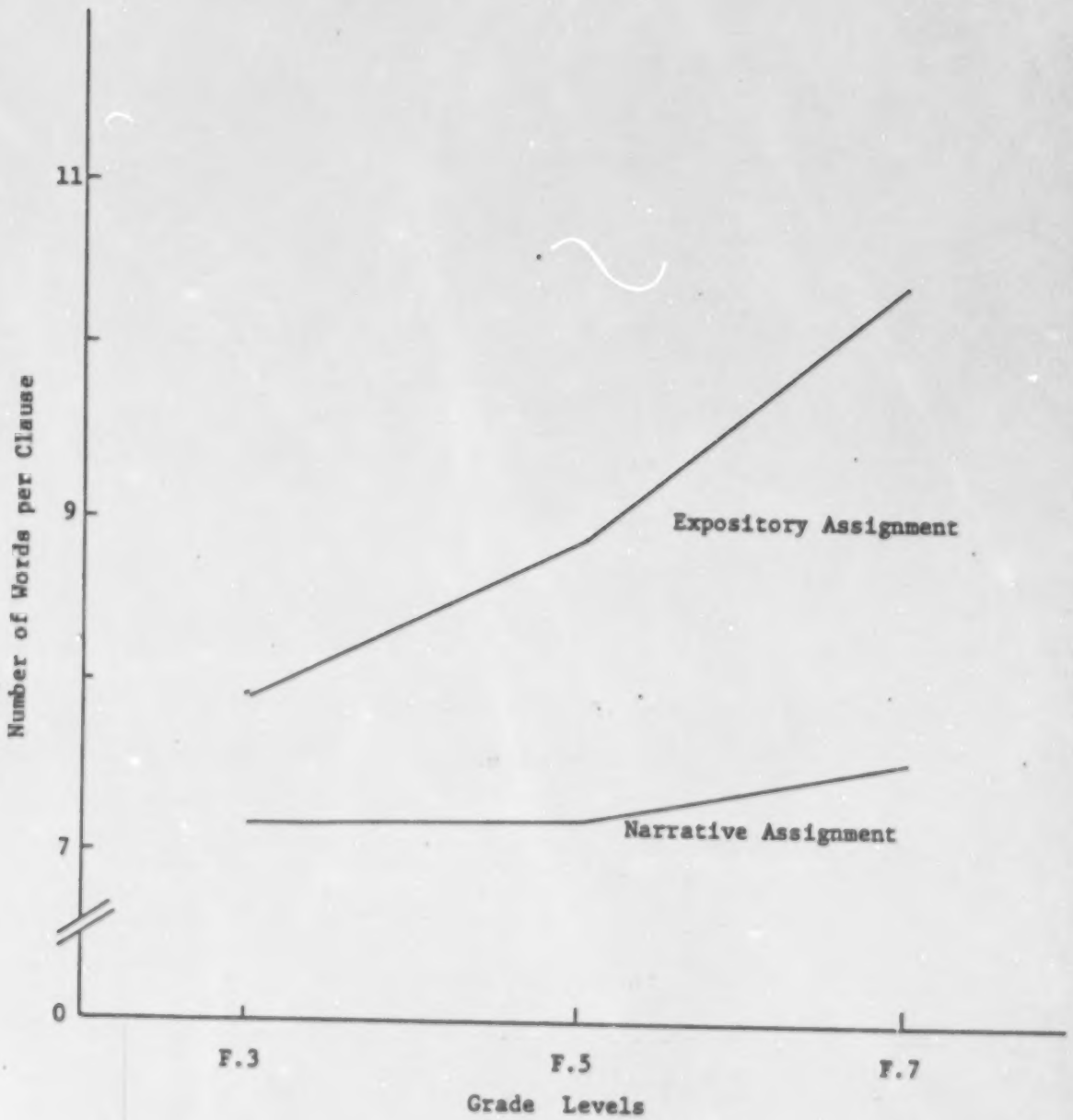


Table 7: Analysis of Variance for Number of Clauses per T-unit Among Three Grade Levels and between Two Modes of Writing; and Mean Change between Grade Levels in Mean Number of Clauses per T-unit

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio	2-Tail Prob.
Mean	242.86	1	242.86	4052.87	<0.0001
Grade	0.71	2	0.35	5.93	0.0046
Within	3.42	57	0.06		
Mode	0.14	1	0.14	3.54	0.0651
ModexGrade	0.09	2	0.04	1.15	0.3227
Within	2.21	57	0.04		

Mean Change

	df	$\bar{d}$
F.7 - F.3	57	0.19*
F.7 - F.5	57	0.10(NS)
F.5 - F.3	57	0.09(NS)

*significant at the .05 level of confidence based on the Newman-Keuls test

increase on this measure with grades was not as great as the previous two measures. Therefore, there was not a significant difference between adjacent grade levels.

Again, unlike the previous two measures, there was not a significant difference between the two modes of writing. The F-value of 3.54 (p=.0651) approached significance but did not reach it. Thus null hypothesis Ho 3c which postulated no difference between the two modes could not be rejected. Nor was there a significant interaction between grade and mode, indicating that grade levels did not affect significantly the increase on this measure in each mode of writing.

B. Differences on three syntactic measures across three grades on the narrative assignment alone

To find out if within the narrative mode of writing students performed differently on the three syntactic measures, Bonferroni t-statistics were used to interpret the results. Table 8 shows the mean change between grade levels on each of the three syntactic measures and the statistical decisions.

Table 8: Mean change between Grade Levels in T-unit Length, Clause length and Number of Clauses per T-unit in the Narrative Assignment

	W/TU	W/CL	CL/TU
F.7 - F.3	2.48**	0.41(NS)	0.26**
F.7 - F.5	1.48*	0.38(NS)	0.14*
F.5 - F.3	1.00(NS)	0.03(NS)	0.12(NS)

**significant at the .01 level of confidence
*significant at the .05 level of confidence
based on the Bonferroni t-statistics

As can be seen from Table 8, when the narrative assignments were examined separately, there was a significant diffference in mean T-unit length and mean number of clauses per T-unit between F.3 and F.7 and between F.5 and F.7 but not between F.3 and F.5. This confirms the findings in Section A that the writing between the F.3 and F.5 students was not sufficiently differentiated. Therefore, there was not a statistically significant difference. On the other hand, there was not a significant difference between any two grades on clause length. As indicated in Section A above, there was a significant interaction between

mode and grade. This grade-wise comparison within the narrative mode confirms the previous conclusion that grade levels do not have an equal effect on both modes of writing. On the narrative assignment, the students hardly increased their clause length at each higher grade.

The nonsignificant increase in clause length on the narrative assignment but a significant increase on the expository assignment (to be discussed in Section C) partly explained the interaction effect found in Section A in T-unit length. Since T-unit length is the product of clause length and number of clauses per T-unit, both factors contribute to the lengthening of the T-units. On the narrative assignment, the F.7 students wrote more clauses per T-unit but not longer clauses than the F.3 students. On the expository assignment, however, they wrote significantly longer clauses. Results of ANOVA, on the other hand, indicate that there was not a significant difference in mean number of clauses between the two modes of writing. In fact, an examination of the raw scores (Table 4) reveals that the F.7 students embedded an equal number of clauses in their T-units in both modes of writing. Since on the narrative assignment the F.7 students increased their T-units solely through the use of an increased number of clauses per T-unit whereas on the expository assignment they used an equal number of clauses per T-unit but increased their clause length substantially, it was logical then that the increase with grade levels on this measure was greater on the expository assignment than on the narrative assignment.

Since there were significant differences in mean T-unit length and mean number of clauses per T-unit among grade levels, null hypotheses Ho 5a and 5c, which postulated no differences between grade levels in T-unit length and number of clauses per T-unit, were both rejected. Since there was not a significant difference in clause length between any two grades, null hypothesis Ho 5b, which postulated no differences between grade levels in clause length, could not be rejected.

C. Differences on three syntactic measures across three grades on the expository assignment alone

To find out if within the expository mode of writing students performed differently on the three syntactic measures, Bonferroni t-statistics were used to interpret the results. Table 9 shows the mean change between grade levels on each of the three syntactic measures and the accompanying statistical decisions.

As can be seen in Table 9, there was a significant increase in mean T-unit length from F.3 to F.7 and from F.5 to F.7. However, like all previous results, there was not a significant difference between F.3 and F.5. The longer T-units written by the F.7 students occurred as a result of the longer clauses that they had written as indicated by the significant increase on

Table 9: Mean change between Grade Levels in T-unit Length, Clause length and Number of Clauses per T-unit in the Expository Assignment

	W/TU	W/CL	CL/TU
F.7 - F.3	4.60**	2.47**	0.12(NS)
F.7 - F.5	2.93**	1.53*	0.07(NS)
F.5 - F.3	1.67(NS)	0.94(NS)	0.05(NS)

**significant at the .01 level of confidence
*significant at the .05 level of confidence
based on the Bonferroni-t-statistics

this measure from F.3 to F.7 and from F.5 to F.7 but a nonsignificant increase in the number of clauses per T-unit between any two grades. While the F.7 students embedded an equal number of clauses into their T-units in both modes of writing, the F.3 students increased this number on the expository assignment, thus bridging the gap that previously existed on the narrative assignment between them and the F.7 students. On this measure, then, there was not a significant difference among any of the three grade levels.

Since there were significant differences in mean T-unit length and mean clause length in this mode of writing, null hypotheses Ho 6a and 6b, which postulated no differences on the two measures on the expository assignment, were both rejected. Since there was not a significant difference in mean number of clauses per T-unit among grade levels, null hypothesis Ho 6c, which postulated no differences on this measure, could not be rejected.

D. Differences between the modes within each grade level

To find out if there was a significant difference between the two modes of writing within each grade, the means in each of the three syntactic measures in the two modes of writing were compared using a t-test for correlated measures.

The mean change on the three measures between the two modes of writing and the t-values on the three measures in each grade are shown in Table 10.

Table 10: Mean Change between Two Modes within Three Grade Levels on T-unit Length, Clause Length and Number of Clauses per T-unit; and corresponding t-values

	W/TU		W/CL		CL/TU	
	$\bar{d}$	t-value	$\bar{d}$	t-value	$\bar{d}$	t-value
F.3	2.04	4.65***	0.77	2.18**	0.12	2.59*
F.5	2.71	5.40***	1.68	3.96***	0.07	1.12(NS)
F.7	4.16	5.41***	2.83	6.42***	0.00	0.00(NS)

***significant at or beyond the .0005 level of confidence
**significant at or beyond the .025 level of confidence
*significant at or beyond the .01 level of confidence

As can be seen from Table 10, the t-values obtained on the difference in the number of words per T-unit between the two modes of writing reached a level of significance ($\alpha \geq .0005$) at all three grades. Thus null hypotheses Ho 7a, 8a and 9a, which postulated no differences between modes at the three grades, were all rejected. Table 10 also shows that on this measure, the t-values for F.7 and F.5 were similar, but were greater than the t-value for F.3. This indicates that the students at F.5

and F.7 showed a greater differentiation in T-unit length in their writing between the two assignments than the students at F.3 did.

The t-values obtained on the difference in the number of words per clause between the two modes of writing also reached a level of significance at each grade ($\alpha \geq .025$). Thus null hypotheses Ho 7b, 8b and 9b, which postulated no differences between modes at the three grades, were all rejected. The t-value for F.7 was greater than the t-value for F.5 which in turn was greater than the t-value for F.3. This indicates that at each higher grade level, there was a greater differentiation between the two assignments on this measure.

The t-values obtained on the difference in the number of clauses per T-unit between the two modes of writing reached a level of significance only at F.3. The t-values diminished with grade levels, until at F.7 there was practically no difference on this measure between the two modes of writing. This indicates that while the F.3 students differentiated the two assignments through the use of two different levels of clause embedding, the F.5 and F.7 students did not. This occurred as the result of a ceiling effect when the students at the two upper grades were already embedding a great number of clauses into their narrative assignments. Thus they could not increase greatly the number of clauses they could embed into their T-units on the expository assignment. Only hypothesis Ho 7c, which postulated no differences between modes at the F.3 level, could be rejected. Ho 8c and 9c, which postulated no

differences between modes at F.5 and F.7, could not be rejected.

E. A summary of the findings in the first level analysis

When the results of the various analyses are combined, a clear picture emerges illustrating the differences on the three syntactic measures in the compositions written by the students in the three grades in response to assignments eliciting a narrative and an expository mode of writing.

1. There was a significant increase in the number of words per T-unit from F.3 to F.7 and from F.5 to F.7 in the two modes of writing combined and in the narrative mode and expository mode alone. However, the lengthening of the T-units at the higher grades was arrived at very differently in the two modes of writing. On the narrative assignment, the longer T-units written by the upper-grade students were lengthened substantially by the multiple embedding of subordinate clauses within the T-unit as is evidenced by the significant increase in the number of clauses per T-unit at each higher grade. Clause length, on the other hand, showed no significant increase with grade levels, indicating that students at the higher grade levels did not write significantly longer clauses in the narrative mode than students at the lower grade wrote. On the expository assignment, however, the longer T-units produced by the upper-grade students were lengthened chiefly through the use of longer clauses. The increase in the number of clauses per

T-unit was negligible in this mode of writing, while th increase in clause length was significant between F.3 and F. and F.5 and F.7 but not F.3 and F.5.

2. There was a significant increase in the number of words pe clause from F.3 to F.7 and from F.5 to F.7 in the two modes o writing combined. However, when looked at individually, onl the expository assignment showed a significant increase on thi measure while on the narrative assignment, the differenc between grades was non-significant.

3. There was a significant increase in the number of clauses per T-unit from F.3 to F.7 in the two modes of writing combined. On the narrative assignment, the increase was significant between F.3 and F.7 and between F.5 and F.7. On the expository assignment, however, the difference between grade levels was not significant.

4. The writing of the F.5 students was not sufficiently differentiated from the writing of the F.3 students; consequently, on none of the measures (whether in the two modes of writing combined or examined separately) was there a significant difference between these two grades.

5. Even at the F.3 level, the students (who are beginning writers in English) performed differently when writing in response to a narrative assignment and to an expository

assignment. At all grade levels, students wrote significantly longer T-units on the expository assignment than on the narrative assignment. The F.3 students produced significantly longer T-units on the expository assignment than on the narrative assignment by writing longer clauses and embedding more clauses into the T-units. At the two higher grade levels, however, students lengthened the T-units on the expository assignment chiefly through writing significantly longer clauses, but there was no significant difference in the number of clauses they embedded into the T-units between the two modes of writing.

F. Differences in three types of grammatical structures across three grades and between two modes of writing

The second-level analysis yielded scores on the frequency of occurrences of grammatical structures produced as a result of sentence combining transformations. Instances of each transformationally-produced structure were tabulated and converted into instances of such per 100 T-units. Then they were classified into three major categories according to their grammatical functions in the sentence: 1) nominals, 2) adverbials, and 3) coordinations within T-units. The total number of occurrences within each category was calculated and means were obtained for each grade and for each mode of writing. Mean scores on each measure for each grade level and for each mode of writing are shown in Table 11.

As can be seen from Table 11, there was an increase in both

the nominal constructions and adverbial constructions with grade levels, but not the coordinate constructions. Across modes, on the other hand, the increase from the narrative assignment to the expository assignment was evident on all three measures.

Table 11: Mean Number of Nominal Constructions, Adverbial Constructions and Coordinate Constructions per 100 T-units Written by Students at Three Grade Levels and in Two Modes of Writing

Measure	Grade	Mode				
		Narrative		Expository		Two Modes
		Mean	SD	Mean	SD	Mean
Nominals per 100 T-units	F.3	113.1	44.2	142.0	50.2	127.6
	F.5	125.8	40.7	197.3	50.2	161.5
	F.7	153.8	45.8	274.0	96.9	213.9
	3 Forms combined	130.9		204.4		167.7
Adverbials per 100 T-units	F.3	29.1	15.2	52.0	22.6	46.6
	F.5	37.7	19.2	69.4	23.1	53.6
	F.7	51.5	26.7	101.1	37.8	76.3
	3 Forms combined	39.4		74.2		56.8
Coordinates per 100 T-units	F.3	28.1	16.1	53.8	31.9	40.9
	F.5	23.2	15.3	51.8	40.0	37.5
	F.7	24.3	9.7	56.7	33.6	40.5
	3 Forms combined	25.2		54.1		39.6

The scores were analyzed by ANOVA in a 3(grade) x 2(mode) factorial design with a repeated measure on the second factor.

Nominal constructions

Table 12 shows the statistical results obtained on the mean

number of nominal constructions from analysis of variance. The table also shows the mean change on this measure that occurred between grade levels and the statistical decisions based on the Newman-Keuls test.

As shown in Table 12, there was a significant difference in the use of this construction across the three grades. The

Table 12: Analysis of Variance for Nominal Constructions per 100 T-units among Three Grade Levels and between Two Modes of Writing; and Mean Change between Grade Levels in Nominal Constructions per 100 T-units

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio	2-tail Prob.
Mean	3373481.7	1	3373481.7	809.11	<0.0001
Grade	151278.7	2	75639.4	18.14	<0.0001
Within	237652.9	57	4169.3		
Mode	162363.0	1	162363.0	47.70	<0.0001
ModexGrade	41722.3	2	20861.2	6.13	0.0039
Within	194023.6	57	3403.9		

Mean Change

	df	$\bar{d}$
F.7 - F.3	57	86.3*
F.7 - F.5	57	52.4*
F.5 - F.3	57	33.9(NS)

*significant at the .05 level of confidence based on the Newman-Keuls test

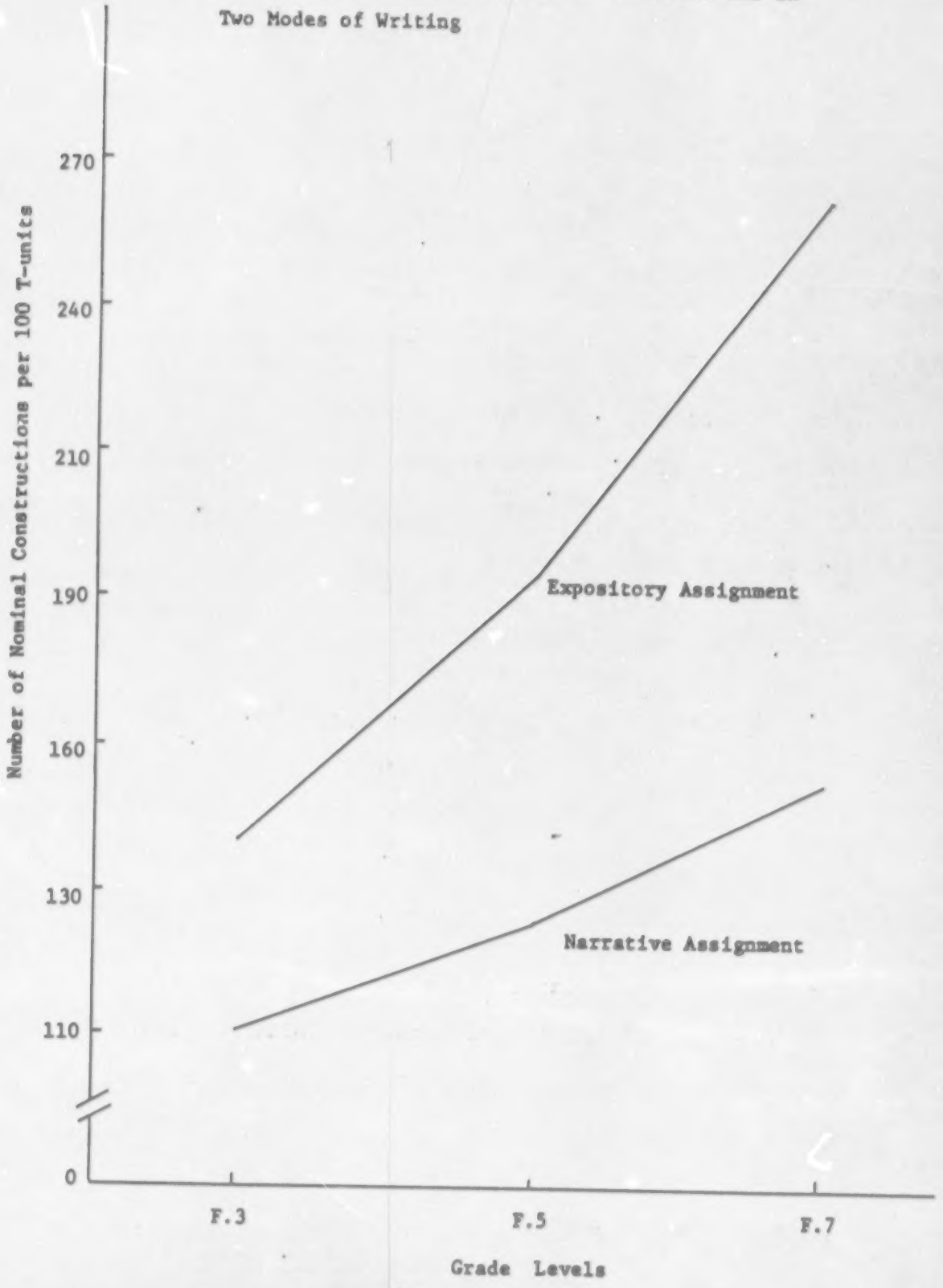
probability level of $p<0.0001$ indicated that the difference was unlikely to have been caused by chance. Post-hoc analysis through the use of the Newman-Keuls test showed that there was a significant difference between F.3 and F.7 and between F.5 and F.7. However, the increase from F.3 to F.5 was not sufficiently great to be statistically significant. This corroborates the

conclusion drawn in Section E. As these structures are partly responsible for the lengthening of clauses and T-units (clauses in particular), a non-significant difference found on this measure as well as in the adverbial and coordinate structures (to be discussed below) between F.3 and F.5 explains the non-significant differences found between these two grade levels on the syntactic measures.

As indicated in Table 12, there was a significant difference in nominal constructions between the two modes of writing. Again, the probability that the difference was caused by chance was extremely low ($p<0.0001$). The students tended to use more nominal constructions on the expository assignment than on the narrative assignment. Null hypotheses Ho 2a and 4a, which postulated no difference in the use of this construction, were both rejected.

There was also a significant interaction on this measure between grade and mode. This again corroborates the earlier interaction effect found between grade and mode in T-unit length and clause length. Figure 3 illustrates that although there was an increase on this measure on each of the two assignments, the increase between grade levels on the expository assignment was much greater than the increase on the narrative assignment. As explained above, these structures are partly responsible for the increase in T-unit length and clause length. Thus, the interaction found on this construction should be similar to the interaction found on the two syntactic measures.

Figure 3: Mean Number of Nominal Constructions per 100 T-units Written by Students at Three Grade Levels and in Two Modes of Writing



Adverbial constructions

Table 13 shows the statisctical results obtained on the mean number of adverbial contructions per 100 T-units. The table also shows the mean change on this measure between grade levels and the statistical decisions based on the Newman-Keuls test.

Table 13: Analysis of Variance for Adverbial Constructions per 100 T-units among Three Grade Levels and between Two Modes of Writing; and Mean Change between Grade Levels in Adverbial Constructions per 100 T-units

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio	2-tail Prob.
Mean	387498.0	1	387498.0	453.41	<0.0001
Grade	26095.0	2	13047.5	15.27	<0.0001
Within	48714.2	57	854.6		
Mode	36383.4	1	36383.4	89.71	<0.0001
ModexGrade	3693.7	2	1846.8	4.55	0.0146
Within	23117.2	57	405.6		

Mean Change

	df	$\bar{d}$
F.7 - F.3	57	35.7*
F.7 - F.5	57	22.7*
F.5 - F.3	57	12.9(NS)

*significant at the .05 level of confidence based on the Newman-Keuls test

As shown in Table 13, there was a significant difference in the use of the adverbial construction across the three grades. The low p-value indicates that it was unlikely that the difference was caused by chance alone. The significant difference was caused by an increase on this measure with each higher grade level as shown in Table 11. The Newman-Keuls test

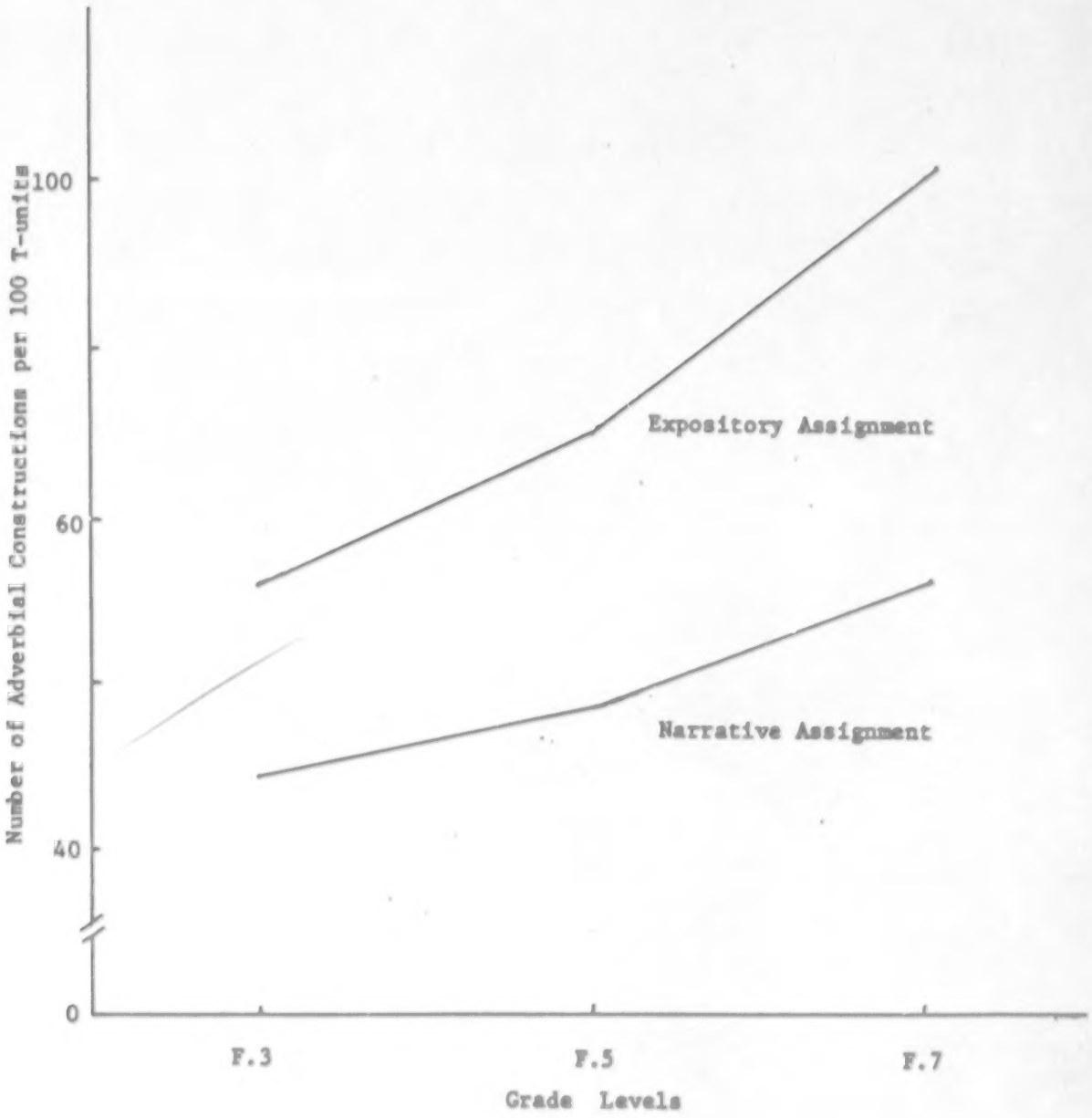
showed that the increases from F.3 to F.7 and from F.5 to F.7 were statistically significant. As with the previous measures, the writing of the F.3 and F.5 students was not sufficiently differentiated to show a statistically significant difference in the adverbial construction.

Table 13 shows that there was also a significant difference on this measure between the two modes of writing. Again, the difference was unlikely to have been caused by chance because of the low p-value ($p<0.0001$). The students tended to use more adverbial constructions on the expository assignment than on the narrative assignment. Null hypotheses Ho 2b and 4b, which postulated no difference in the use of the adverbial construction, were both rejected. There was also a significant interaction on this measure between grade and mode. As with the nominal constructions, the increase between grade levels on the expository assignment on this measure was much greater than the increase on the narrative assignment. The interaction is illustrated in Figure 4.

Coordinations within T-units

Table 14 summarizes the statistical results obtained on the mean number of coordinate contructions 100 T-units from analysis of variance. It shows that there were no significant differences in the use of the coordinate construction across the three grades. That is, any differences found on this measure were likely to be attributable to sampling errors or to chance alone. Thus hypothesis Ho 2c, which postulated no differences among grade levels in the coordinate constructions, could not be

Figure 4: Mean Number of Adverbial Constructions per 100 T-units Written by Students at Three Grade Levels and in Two Modes of Writing



rejected. However, there was a significant difference on this measure between the two modes of writing. This difference, on the other hand, was unlikely to be attributable to chance because of the extremely low p-value ($p<0.0001$). The students tended to use more coordinate constructions on the expository assignment than on the narrative assignment. Null hypotheses Ho 4c, which postulated no differences between modes in the coordinate construction, was thus rejected. There was no significant interaction on this measure between grade and mode. This is accounted for by the fact that the increase from the narrative assignment to the expository assignment was similar at each grade level.

Table 14: Analysis of Variance for Coordinate Constructions per 100 T-units among Three Grade Levels and between Two Modes of Writing; and Mean Change between Grade Levels in Coordinate Constructions per 100 T-units

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio	2-tail Prob.
Mean	188633.1	1	189633.1		
Grade	289.0	2	144.5	234.43	<0.0001
Within	45864.4	57	804.6	0.18	0.8361*
Mode	25082.0	1	25082.0		
ModexGrade	227.5	2	113.8	39.15	<0.0001
Within	36414.0	57	640.6	0.18	0.8378

*since analysis of variance indicated that there were no differences among grade levels, the Newman-Keuls test was not conducted.

Since there were no significant differences across grade levels, Newman-Keuls tests were not conducted.

G. Differences in the use of transformationally-produced structures within each grammatical category across three grades

To find out which structures within each grammatical category accounted more for the difference found across the three grades, a stepwise discriminant analysis was performed on each of the two grammatical categories of nominals and adverbials. No such analysis was performed on coordination within T-units as this construction was found not to be discriminating of the writing across the three grades. A number of structures were isolated which were used significantly more often at F.7 than at F.3. Results of the stepwise discriminant analysis are outlined below.

Nominal constructions

Of the twelve structures isolated within the nominal construction, eight were found to be able to discriminate among the writing produced by the students at the three grades (α=.05). That is, if independent analysis of variance were performed on these structures, these eight would produce a significant main effect across the three grades. These eight structures, grouped according to a descending order of discriminating power, together with their F-values, are listed below:

Gerund	(GRTU)	9.866
Noun+adjective	(NATU)	9.415
Noun+prepositional phrase	(PPTU)	7.514
Noun+relative clause	(NRTU)	7.481
Noun clause	(CLTU)	5.573
Noun+genitive	(NGTU)	4.452
Noun+appositive	(APTU)	4.110
Noun+participle	(PATU)	3.741

All these F-values exceed the critical value required to reach a level of significance at .05.

When the structure with the highest F-value (i.e., Gerund) was entered into a linear equation and used as a covariate for the computation of the F-values for the remaining measures, only four maintained an F-value that exceeded the critical F-value required. These four structures are Noun+adjective, Noun+appositive, Noun+genitive and Noun+prepositional phrase. Since Noun+adjective has the highest F-value among the four, together with the first variable (Gerund), it was entered into a second linear equation and the two served as covariates for the remaining variables. At this stage, none of these remaining variables had an F-value great enough to be significant. Therefore, the computation of a third discriminant function was not carried out. It can thus be concluded that within this grammatical category, the structures that would most optimally discriminate the writing across the three grades were Gerund and Noun+adjective. These two structures were able to place 85 percent of the F.3 students, 35 percent of the F.5 students, and 60 percent of the F.7 students into their correct groupings. These two structures were especially useful to discriminate the writing of the F.3 students from the writing of the F.7 students

as none of the F.3 students used these two structures to an extent that approached the performance of the F.7 students. Full details of the results obtained on the nominal construction are presented in Appendix J.

Adverbial constructions

Of the eight structures isolated within the adverbial construction, five were found to be able to discriminate among the writing produced by the students at the three grades (α=.05). All five structures were sub-groups of sentence adverbials. These five structures, together with their F-values, are listed below:

Sentence connector	(SACTU)	17.450
Prepositional phrase	(SAPTU)	11.351
Abolute	(SAATU)	7.970
Others	(SAOTU)	6.733
Interjection	(SAITU)	6.128

All these F-values exceeded the critical value required to reach a level of significance at .05.

When the structure with the highest F-value (i.e., Sentence connector) was entered into a linear equation and used as a covariate for the computation of the F-values for the remaining measures, all but the sentence adverbials Others reached a significant F-value. Then Absolute was combined with Sentence connector in a second linear function. With these two as covariates, only Interjection had a significant F-value. When Interjection was combined with the other two measures and used as covariates, none of the remaining measures had a significant F-value. It can thus be concluded that these three structures

are the optimal variables for discriminating among the writing produced by the three groups of students. The three structures were able to place 95 percent of the F.3 students, 50 percent of the F.5 students, and 60 percent of the F.7 students into their correct groups. In the use of these three structures, none of the F.7 students wrote at the F.3 norm while none of the F.3 students approached the F.7 norm and only one approached the F.5 norm. Full details of the results obtained on the adverbial construction are presented in Appendix K.

H. Differences in the use of transformationally-produced structures within each grammatical category between two modes of writing

To find out which structures within each grammatical category accounted more for the difference found between the two modes of writing, a stepwise discriminant analysis was performed on each of the three grammatical categories. Certain structures are found to be able to discriminate between the two modes of writing. Results of the analysis are outlined below.

Nominal constructions

Of the twelve structures isolated within this category, five were found to be able to discriminate between the two modes of writing (at α=.05). They are listed below with their corresponding F-values:

Noun+adjective	(NAGN)	56.384
Gerund	(GRGN)	15.118
Noun+prepositional phrase	(PPGN)	14.333
Noun+genitive	(NGGN)	7.526
Noun+infinitive	(NFGN)	4.348

All these F-values exceeded the critical value required to reach a level of significance at .05.

When the structure with the highest F-value (i.e., Noun+adjective) was entered into a linear equation and used as a covariate for the computation of the F-values for the remaining measures, only Noun+participle (PAGN) had an F-value (3.422) which exceeded the critical F-value. This measure, which previously did not have a significant F-value, came out when the factor shielding it (in this case Noun+Adjective) was removed. However, since this F-value was small in comparison to the F-value of the covariate, the step was aborted at this stage. It can thus be concluded that the structure Noun+adjective is the best discriminator between the two modes of writing. It was able to place 95 percent of the narrative assignments and 90 percent of the expository assignments into their correct category. Full details of the results obtained on the nominal construction are presented in Appendix L.

Adverbial constructions

Of the eight structures isolated within this category, all but one--Sentence adverbial absolute (GSAA)--failed to reach an F-value great enough to be significant at .05 level. The F-values for the other seven structures are shown below:

Sentence connector	(GSAC)	39.907
Adverbial clause other than time	(GCLO)	31.974
Adverbial infinitive	(GANF)	19.886
Sentence adv. prepositional phrase	(GSAP)	15.198
Sentence adverbial interjections	(GSAI)	6.128
Adverbial clause of time	(GCLT)	4.098
Sentence adverbial (other)	(GSAO)	3.780

The first variable entered into the discriminant function was Sentence connector (GSAC) which had an F-value of 39.907. The second variable to enter into the second discriminant function (together with the first) was Adverbial clause other than time (GCLO). At this step, Absolute (GSAA) rose to a significant F-value. The explanation was that this variable was masked by the other two variables, or, putting it differently, this variable contributed to the discriminant function in a direction opposite to either of the previous two variables. When GSAA was entered into a third discriminant function, none of the remaining variables remained significant. It can thus be concluded that these three variables are the optimal variables within the adverbial construction for discriminating between the two modes of writing. The three variables were able to place 90 percent of the narrative assignments and 85 percent of the expository assignments into their correct categories. Full details of the results obtained on the adverbial construction are presented in Appendix M.

Coordination within T-units

All three coordinate structures were able to discriminate between the two modes of writing; but Coordination between modifiers (GMOD) was the best discriminator. In the presence of

this structure, Coordination between predicates (GPRD) was better able to differentiate between the two modes of writing than Coordination between nominals (GNOM). The three coordinates were able to place all the narrative assignments (100 percent) and 80 percent of the expository assignments into their correct categories. Full details of the results obtained on the coordinate construction are presented in Appendix N.

I. A summary of the second level analysis

When the results of the various analyses are combined, the following picture emerges:

1. At each higher grade, students produced more nominal structures. The significant difference between grade levels was contributed mainly by eight structures--Gerund, Noun+adjective, Noun+prepositional phrase, Noun+relative clause, Noun clause, Noun+genitive, Noun+appositive, and Noun+participles. Among these structures, however, Gerund and Noun+adjective were the best discriminators.

2. At each higher grade, students produced more adverbial structures. The significant difference between grade levels was contributed mainly by the group of sentence adverbials. Within the group, Sentence connector, Absolute, and Interjection formed the optimal variables for discriminating among the three grades.

3. Coordination within T-units was not a good discriminating factor for the three grade levels.

4. On the expository assignment, students used significantly more nominal structures than on the narrative assignment. Structures that contributed significantly to this difference were Noun+adjective, Gerund, Noun+prepositional phrase, Noun+genitive and Noun+infinitive. Among these structures, however, Noun+adjective alone could differentiate adequately between the two modes of writing.

5. On the expository assignment, students used significantly more adverbial structures than on the narrative assignment. All structures within this category made a significant contribution to the difference except Sentence absolute. This structure, however, formed one of the best discriminators in that this was the only one factor among the group that did not show an increase on the expository assignment. The three variables that could adequately discriminate between the two modes of writing were Sentence connector, Adverbial clause other than time, and Sentence absolute.

6. On the expository assignment, students used significantly more coordinations within T-units. Among the three kinds of coordinations, coordination between modifiers and coordination between predicates were better able to differentiate between the two modes of writing than coordination between nominals.

CHAPTER FIVE

CONCLUSIONS AND IMPLICATIONS

The study focused on the following questions:

1. Did the compositions written by a group of Chinese secondary school ESL students show that these students increase their syntactic maturity in the second language as they reach a more advanced level of second language learning; and was their development in syntactic maturity similar to the development exhibited by native English speaking secondary school students?
2. Did these ESL students employ different syntactic and grammatical options at three levels of second language learning (intermediate, advanced, and very advanced) and in two modes of writing (narrative and expository)?

To answer these questions, a group of Chinese ESL students studying at Form 3, 5 and 7 were asked to write two compositions to produce a writing sample of about 400 words per student. The compositions were written under conditions that favoured good writing performance through the use of a series of prewriting procedures. The compositions were written in response to two writing tasks: the first task asked for writing in the narrative mode and the second, the expository mode. The two writing tasks were designed to allow their writing performance on the two assignments to be compared.

After the compositions were collected, they were screened for garbled expressions which were then deleted. Then the

compositions were segmented into T-units and clauses, and the mean T-unit length, mean clause length, and the mean number of clauses per T-unit were calculated for each grade level and in each mode of writing. Three transformationally-produced grammatical structures (nominals, adverbials and coordinations within T-units) were also isolated from the writing and their occurrences within each grammatical category were tabulated and compared across the three grade levels and in the two modes of writing.

The principal statistical procedure used was analysis of variance to determine if there were significant differences on the three syntactic measures and on the three grammatical structures among the three grade levels and between the two modes of writing. Secondary statistical procedures were 1) the Newman-Keuls test to determine between which two grade levels there was a significant difference on the syntactic measures; 2) Bonferroni t-statistics to compare grade-level differences on the syntactic measures in each mode of writing; 3) t-test for correlated measures to determine if there were significant differences on the three syntactic measures between the two modes of writing within the same grade level; and 4) stepwise discriminant analysis to determine which structures within each grammatical category were best able to discriminate the writing done by students at the three grade levels and in the two modes of writing.

A. Summary and conclusions

Analysis of the compositions written by these ESL students indicated that at each higher grade level, the students exhibited greater syntactic maturity as is evident from the increase in T-unit lengh, clause length, and number of clauses per T-unit. The increase on the first two measures was statistically significant between F.3 and F.7 and between F.5 and F.7. The increase in the number of clauses per T-unit was statistically significant between F.3 and F.7 only.

Since all three indices are affected by the number of sentence combining transformations performed, the increase on these three indices suggests that as these ESL students reach a more advanced level of second language learning (as in the case of the F.7 students), they increase their ability to combine sentences. Such an increase can be regarded as growth and not an idiosyncratic characteristic of the students at a particular grade level because the scores of the F.5 students on all three measures were very close to the mean scores for the three grades. Since the F.5 students are at an intermediate stage of second language learning compared with the F.3 and F.7 students, the juxtaposition of their scores between the two grade levels indicates that the increase on these measures from F.3 to F.7 is a gradual and sequential change over the years and not a change that occurs erratically.

Analysis of the three types of grammatical structures indicates that the compositions written by the F.7 students were

differentiated from those written by the F.3 students through the more frequent use of certain kinds of sentence combining transformations. While all three types of grammatical structures isolated in the study were produced by such kinds of transformations and therefore all three have potential to contribute to the increase in T-unit length and clause length found in the writing of the F.7 students, results indicated that only two of these structures--nominals and adverbials--accounted for the growth on these measures. The third structure--coordinations within T-units--did not show an increase with grade level. Coordinations within T-units simply add more details to exisiting propositions but do not explicitly indicate the relations between different propositions. Such a kind of linear conjoining (as opposed to a hierarchical conjoining expressed in a transformationally-produced nominal or adverbial construction) has been found by researchers (Hunt, 1965 and O'Donnell et al., 1967) to be a type of transformation that is acquired relatively early. In the current study, coordinations within T-units were already used frequently by the F.3 students. Stylistic considerations prevent a greatly expanded use of this construction. This then accounts for the lack of growth in this structure with grade levels.

An examination of the raw scores (Appendix I) suggests that almost all of the structures isolated in the three grammatical categories were used to a greater or lesser extent by the students at all three grades. However, results of the discriminant analysis clearly indicate that the mature writers

(the F.7 students) distinguish themselves from the immature writers (the F.3 students) in the extent that they use certain structures. The structures that the discriminant analysis isolated within the nominal construction that were used significantly more often by the F.7 students were gerunds, nouns modified by an adjective, nouns modified by a prepositional phrase, nouns modified by a relative clause, noun clauses, nouns modified by a genitive, nouns modified by an appositive, and nouns modified by a participle. Among these structures, gerunds and nouns modified by an adjective were found to be the two best structures to discriminate the writing of the students at the three grades. Using these two structures in a classification function, the discriminant analysis revealed that while the F.7 and F.5 students showed variability among individuals within the group by writing above or below their respective group norms, the F.3 students were relatively consistent in the use of these two structures. Eighty-five percent of the F.3 students wrote at the F.3 norm while three of them (accounting for the remaining 15 percent) used these two structures a similar number of times as the F.5 norm but none of them used these two structures to the same extent as the F.7 norm. This clear distinction between the F.3 and F.7 students in their employment of these structures in their writing lends further support to the suggestion that maturity of syntax is not reflected in the kinds of structures that the students employed but in the extent that they employ certain mature structures.

Within the adverbial construction, the 'mature' structures

isolated were the group of sentence adverbials. These are characteristically movable elements, not closely related to a single constituent within the sentence. These structures were also found by O'Donnell et al. (1967) to be the structures used significantly more often by students at upper grade levels. Among these structures, sentence connectors, adverbial absolutes and interjecions were found to be the best structures to discriminate between the compositions written at the three grade levels. These three structures defined the three groups more sharply than the nominal structures did. While some F.5 students overlapped with both the F.3 and F.7 norms in the use of these structures, 7 of the F.7 students (accounting for 35 percent of the group) wrote at the F.5 norm but none of them wrote at the F.3 norm. Only one F.3 student wrote at the F.5 norm while the rest (95 percent of the group) conformed to the F.3 norm.

Both the syntactic analysis and the grammatical analysis revealed that the development of syntactic maturity in these students is very similar to the development exhibited by native English speaking students. As reviewed in Chapter Two, various studies that look into the growth of syntactic maturity in both the speech and writing of native English speaking students show that there is an increase on the syntactic measures with the increase in grade levels. Crowhurst (1979) compared eight such studies conducted in Canada and the United States and noted in particular the similarities of the data (in mean T-unit length) within the same grade levels across the various studies. A

comparison of the syntactic data in this study with the data in the others was not carried out because of the variations between this study and the others in topics, modes, audience, and the conditions under which the language sample was obtained, variations concluded by researchers (e.g., Crowhurst and Piche, 1979) to affect the syntactic scores. However, so far as the developmental trend is concerned, the increase on these measures with grade levels found in this study agrees with the findings in studies using both native language data and second language data, indicating that as the students gain experience in using the language, they also increase their ability to combine sentences, thereby producing longer T-units and clauses.

The increase found on the syntactic measures in this study could be dismissed as representing merely a superficial resemblance to native language data if these ESL students increased their T-units and clauses in ways different from those used by native English speaking students. But this is not the case. In fact, the similarity in the employment of 'mature' structures by the ESL students at a higher grade level was striking between the current study and investigations with first or second language syntactic development. This study and three others (Hunt, 1965; O'Donnell et al., 1967; Cooper, 1976) have found that nominal structures show the most consistent increase with increased experience in the first or second language. Within this grammatical construction, structures found to be used significantly more often by more mature students were also very similar. Seven of the eight structures isolated in this

study (the eighth being nouns modified by appositives which were not analyzed in either the Hunt or O'Donnell et al. study) coincided with the 'mature' nominal structures isolated by Hunt who found that headed nominals modified by adjectives, genitives, prepositional phrases, adjective clauses and non-finite verbs (infinitives and participles) were used more frequently by students at each higher grade. He also found that all the non-headed nominal structures showed an increase with grade levels, but the most striking increase was in the use of gerunds which increased four times from grade 4 to grade 8, and ten times from grade 4 to grade 12. In this study, the stepwise discriminant analysis indicated that gerunds best discriminate the writing done by students at the three grade levels, supporting Hunt's observation. In addition, Hunt found that nouns modified by a noun adjunct are not indicative of the maturity of writing; the same was found in the current study.

The findings of the present study and the Hunt study also agree with those of the O'Donnell et al. study in which younger subjects were used. The result O'Donnell et al. obtained on the nominal constructions in the writing sample is quoted below:

> Among subtypes of the nominal constructions studied, those in which a noun is modified by another noun, an adjective, a prepositional phrase, a participle, or a genitive form showed large overall increase in use by grade in both speech and writing....In writing, significant increments were observed in the use of genitive modifiers and relative clauses in grade 5, and in the use of prepositional phrases, participial phrases, and gerund phrases in grade 7 (p.78).

This study and the O'Donnell et al. study found a significant increase in the use of the adverbial construction

with grade levels, but the increase was mainly accounted for by the group of sentence adverbials. Hunt (1965) and Cooper (1976) did not find such an increase in the use of this construction in their studies, but neither of them analyzed the instances of sentence adverbials. Neither this study nor the O'Donnell et al. study found significant increment in the use of adverbial structures other than the group of sentence adverbials. In this sense, the four studies are in agreement.

In the current study and the studies by Hunt and O'Donnell et al., the coordinate construction was not found to be indicative of the maturity in writing among grade levels. Cooper found conflicting results in the use of this construction in his study. While he found native German speakers using more coordinations within T-units in their writing than undergraduate or graduate students learning German as a second language, he also found the beginning German learners using more of this construction than the learners at level 3 or level 4. Since neither subject matter, topic nor mode was controlled in his study, his finding may have been confounded by these variables. The agreement between the current study and the first two studies, however, lends strong support to the claim that coordination within T-unit is a structure acquired early.

This close agreement in the structures employed by the students in the three studies indicates that growth in syntactic maturity does not occur in a haphazard manner. When the students increase their syntactic maturity, they do so through the more frequent use of certain 'mature' structures. Since the

writing tasks by which these structures were elicited were different in the three studies, that the same structures were used more frequently by the older students suggests that they might have been induced by the more mature cognitive and linguistic abilites of the older students. These 'mature' structures are, namely, the group of sentence adverbials, nouns modified by adjectives, prepositional phrases, participles or participial phrases, relative clauses, genitives, and gerunds and gerundial phrases.

Analysis of the students' performance in response to two modes of writing (narrative and expository) reveals that the students employed different syntactic and grammatical structures in the two modes of writing. In general, they wrote longer T-units and longer clauses on the expository assignment, but they did not increase the number of clauses per T-unit significantly from grade to grade. The increase in T-unit length and clause length was contributed to by all three types of grammatical structures. Within the nominal construction, the students were found to use a greater number of nouns modified by an adjective, gerunds, nouns modified by a prepositional phrase, nouns modified by a genitive and nouns modified by an infinitive on the expository assignment than on the narrative assignment. However, the most discriminating variable among the group between the two modes of writing was noun modified by an adjective (which has an F-value of 56.384, much higher than the critical value of 3.2 required to reach the .05 level of significance). The frequent occurrences of this structure on

the expository assignment may be due to the nature of the particular composition topic. The topic asked for the students' idea of an ideal person. Throughout the compositions, then, the students made abundant use of the word 'ideal' which accounts for the large number of nouns modified by adjectives in the expository mode.

Within the adverbial construction, increases were found for all the structures except the sentence adverbial absolute. Sentence adverbial absolutes are typical 'free' modifiers which function to add subordinate details. The expository assignment, however, demands the explicit expression of relations between propositions. This may explain why such a structure did not increase significantly on the expository assignment. On the other hand, the two structures found to discriminate best between the two modes of writing--sentence connectors and adverbial clauses other than time--fit well within the expository mode of writing. The former express relations between sentences while the latter express relations between clauses such as cause, reason, concession or result. Since the expository assignment requires the expression of such kinds of relationships, it is logical to find the students using these two structures a large number of times.

However, the students at the three grade levels did not respond to the two assignments in the same way. While students at all three grade levels showed differentiation between the two modes of writing, analysis of variance and the subsequent grade-wise and mode-wise comparisons indicated that there was a

greater differentiation in T-unit length and clause length between the two modes of writing with each higher grade level. The syntactic options employed at the upper grade (F.7) and the lower grade (F.3) were also different, as a comparison of the students' performance in the two modes of writing at the two grade levels makes clear.

The T-units written by the F.7 students were significanlty longer than the T-units written by the F.3 students in both modes of writing. However, the significanlty longer T-units produced by the F.7 students were lengthened very differently in the two modes of writing. On the narrative assignment, while the F.7 students did not write significantly longer clauses than the F.3 students did, they embedded a significantly greater number of subordinate clauses into their T-units. As hypothesized by Mellon (1979) (and reviewed in Chapter Two), subordination is a syntactic device that adds secondary statements to the main clauses. If this is the case, the employment of this syntactic device served to add more details to the F.7 narration. The F.3 students, on the other hand, employed a low level of clause embedding (mean score on this variable for F.3 is 1.26, compared to 1.52 for F.7). A subjective examination of the sample indeed suggested that the F.7 narrations had more details than the F.3 narrations.

On the expository assignment, the F.7 students made use of significantly longer clauses than the F.3 students did. As longer clauses are formed by the addition of non-clausal elements (which in turn represent a kind of compressed thought

unit), the longer clauses written by the F.7 students mean that they were expressing the relations between propositions in a variety of ways besides using subordination. If as Hunt (1977) noted, longer clauses are usually the result of a deeper level of non-clausal embedding, these F.7 students were also expressing more complex relationships in their writing than the F.3 students were.

The clauses written by the F.3 students on the expository assignment were, on the average, 2.47 words shorter than the clauses written by the F.7 students. Two possible explanations for the relatively shorter clause length produced by the F.3 students are the students' lack of familarity with the expository mode of writing and their lack of fluency in syntactic manipulation. A subjective examination of the F.3 expositions suggested that many of the F.3 students turned the exposition into a kind of narrative description. Even those who managed to conform to the writing instruction made use of a substantial number of narrative details as support for their expositions. Being inexperienced writers (free writing in English starts at the F.3 level in the school where the current study was conducted), these F.3 students may not have had so much practice in the expository mode as they did in the narrative mode. (This explanation agrees with the intuition of teachers of beginning writers: Crowhurst (1980) reported that Grade 6 teachers did not often ask their students to write in the argumentative or expository mode.) Their lack of familiarity with the expository mode of writing may then explain

why the F.3 students depended on the narrative details as support for their exposition. Since narration does not usually entail a high level of syntactic complexity, the narrative details that these students used in their expositions may partly account for the shorter clause length of their expositions.

A second possible explanation for the shorter clauses written by the F.3 students is their lack of fluency in syntactic manipulation, or lack of fluency in writing in general. Being unsophisticated users of the second language and unskilled writers (compared to the F.7 students), their poor abilities in English might constrain them from attending to the rhetorical tasks in the way that the F.7 students did. Bereiter (1980) suggested:

> Mature writing involves a large number of skills at different processing levels. Adequate mature functioning can be possible only when many of the skills are highly automated and when they are well enough coordinated to permit efficient time-sharing. Neither of these conditions is met in the young writer, and so the young writer, in order to function at all, must employ a structurally simplest system that does not require so much simultaneous and coordinated functioning. Since low-order schemes--those involved in getting words on to paper--must take priority in order for writing to occur, it follows that the system employed by the young writer must be one in which low-order schemes predominate and higher order schemes play a lesser part...(p.82).

Attention to such low-order schemes results in a kind of "associative writing" which "consists essentially of writing down whatever comes to mind, in the order in which it comes to mind" (Bereiter, 1980, p.83). Whether the F.3 students produced such kinds of associative writing remains to be investigated, but Bereiter's suggestion may partly explain the narrative details and, in general, the shorter clauses found in the F.3

exposition. Narration does not require the kind of abstraction that exposition or argumentation entails and is therefore the least cognitively demanding of the three to process (cf., Winterowd, 1983). Shorter clauses are also less cognitively straining to process (Kerek, 1981). Since the F.3 students were not fluent in the second language, the difficulty they experienced in writing an exposition in English (a demanding mode of writing even for native English speaking students) may have focused their attention on the lower-order schemes described by Bereiter which, in turn, may have caused them to opt for rhetorical devices that made the least demand on them. This may partly account for the fact that they wrote less complex syntax and employed more narrative details in their expositions.

Again, such differentiation in the syntactic strategies exhibited by the students at different grade levels in response to different writing assignments is not particular to this study. Even Grade 4 students have been found to show similar differentiation (see San Jose, 1972). However, the studies by Crowhurst and Piche (1979) and Crowhurst (1980) indicated that at a higher grade level, such differentiation was more marked than at a lower grade level. The current study corroborates this finding. There were also similarities in the syntactic strategies that the students employed in different modes of writing between the current study and the studies by Crowhurst and Piche (1979) and Crowhurst (1980). These two studies and the current study found students showing a differentiation on

the syntactic measures between two modes of writing even at the lower grade levels. Crowhurst and Piche (1979) found increases on all three syntactic measures to be nonsignificant on the narrative assignment even with a four-year interval in between, while the current study found a nonsignificant increase in clause length in this mode, though there was an increase in the number of clauses per T-unit. Although the two studies are not in perfect agreement, the lack of growth in clause length in the narrative mode with grade levels lends some support to the suggestion of Crowhurst and Piche (1979) that age-related increases in the syntactic measures may stop at a certain point in the narrative mode.

B. Implications

This study illustrates that at a more advanced level of second language learning, there is growth in syntactic maturity. Moreover, when this growth is compared to the syntactic growth of native English speakers, the growth trends are very similar. The study also indicates that ESL students show differentiation in the syntactic options they employ in writing in different modes, with greater differention in the more advanced learners. Two implications can be drawn form this study regarding the teaching of writing to ESL students.

1. The similarity in the development of syntactic maturity exhibited by these students and native English speaking students

is perhaps caused by common cognitive strategies underlying every language learning task. After an extensive examination of acquisitional data in both first and second language and noting the striking similarities in the learning strategies exhibited by both first and second language learners, McLaughlin (1978) proposed that the similarities are really reflections of some common cognitive strategies that underlie every language learning task. In the investigation of syntactic development, common developmental trends can be found across the various studies, including the present one. The studies by Hunt (1977) and Reesink et al. (1971) indicated that a growth in syntactic maturity is a common characteristic of native speakers of languages besides English. The studies by Cooper (1976) and Monroe (1975) also indicated that learners of a second language other than English exhibit similar growth in syntactic maturity. Kerek (1981) and Mellon (1979) explained that the complex syntax was almost a necessary outcome of a person's growth in his cognitive and conceptual ability. In the case of the second language learners, the use of complex syntax at a more advanced level of second language learning (cf., the F.7 students) seems to be a reflection of the learners' fluency in the language that enables them to overcome the linguistic constraint so that the mature cognitive abilities that they already possess enable them to express similar complex relations between propositions in the second language as they would in their native languages. The similarity in the various studies can not simply be explained as a result of common instructional methods for these studies

involve the teaching of a wide variety of languages. To explain this as the outcome of common cognitive strategies seems more feasible because such a growth trend transcends language barriers.

In the teaching of English writing to ESL students, the above discussion implies that since first and second language learning involves the use of common cognitive strategies, what has been found by research to benefit writing development in native speakers may also benefit second language learners. Zamel (1976) summarized writing research done with native English speaking students and concluded that an error-oriented approach would not benefit the development of writing abilities. Such an approach, however, is still used extensively in second language writing programs. The emphasis in first language writing programs has now been shifted to a process oriented approach, instead of the former product oriented approach and research (e.g., Clifford, 1981) has found such an approach beneficial to writing performance. Perhaps the process-oriented approach should also be tried in a second language writing program to find out its effect on writing.

2. The current study provided some information concerning the syntactic options employed by ESL learners at three levels of second language learning. A developmental trend is clearly evident from the intermediate learners to the very advanced learners. The study also isolated certain structures that were used more often by the very advanced learners. A possible

explanation is that the more mature syntax is related to the advanced learners' fluency in the language. If the intermediate learners (the F.3 students) lack the fluency that the advanced learners have, one speculation that arises from this study is whether their fluency can be enhanced through some kind of intense practice in writing such as sentence combining. Sentence combining has been found in native language research to enhance the development of syntactic maturity though there is controversy as to whether the increase in syntactic maturity necessarily brings about improved writing quality (see O'Hare, 1973, 1979/80; Mellon, 1979; Crowhurst, 1983).

An argument for using sentence combining in the second language writing program (as was done by Cooper and Morain, 1980) is that the students already possess the mature cognitive abilities to allow them to appreciate the complex interrelations that can exist between different propositions, but that their lack of ease in syntactic manipulation prevents them from expressing such relationships. What sentence combining can do is give them intense practice in writing so that they can overcome their lack of fluency in syntactic manipulation. Another argument that can be drawn from this study is that many of the 'mature' structures are already employed by at least some of the youngest writers. If the F.3 students can be induced to use more of the mature structures, they will perhaps produce better writing.

To implement sentence combining in a second language program, however, cognizance must be taken of the semantic and

the rhetorical aspect of writing. As non-native speakers of English, these students do not have an inherent sense of grammar because of their limited contact with the language. Therefore, they must be taught explicitly what combinations are possible, and how different combinations lead to different rhetorical effects, and this would make implementing the program not so easy as many sentence-combining researchers suggest. In any case, not enough seems to have been done with sentence combining in a second language program, and this may be a worthwhile research topic to pursue.

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APPENDIX A

For the purpose of statistical analysis, the seven questions asked in Chapter One were translated into the following null hypotheses:

Ho 1a: There will be no significant differences between grade levels in mean T-unit length in the writing of F.3, F.5 and F.7 students.

1b: There will be no significant differences between grade levels in mean clause length in the writing of F.3, F.5 and F.7 students.

1c: There will be no significant differences between grade levels in mean number of clauses per T-unit in the writing of F.3, F.5 and F.7 students.

Ho 2a: There will be no significant differences between grade levels in the number of occurrences of nominal constructions in the writing of F.3, F.5 and F.7 students.

2b: There will be no significant differences between grade levels in the number of occurrences of adverbial constructions in the writing of F.3, F.5 and F.7 students.

2c: There will be no significant differences between grade levels in the number of occurrences of coordinate constructions in the writing of F.3, F.5 and F.7

students.

Ho 3a: There will be no significant differences in mean T-unit length between the writing done in response to a narrative assignment and the writing done in response to an expository assignment.

3b: There will be no significant differences in mean clause length between the writing done in response to a narrative assignment and the writing done in response to an expository assignment.

3c: There will be no significant differences in mean number of clauses per T-unit between the writing done in response to a narrative assignment and the writing done in response to an expository assignment.

Ho 4a: There will be no significant differences in the number of occurrences of nominal constructions between the writing done in response to a narrative assignment and the writing done in response to an expository assignment.

4b: There will be no significant differences in the number of occurrences of adverbial constructions between the writing done in response to a narrative assignment and the writing done in response to an expository assignment.

4c: There will be no significant differences in the number of occurrences of coordinate constructions between the writing done in response to a narrative assignment and the writing done in response to an expository assignment.

Ho 5a: There will be no significant differences between grade levels in mean T-unit length in the writing done in response to a narrative assignment written by F.3, F.5 and F.7 students.

5b: There will be no significant differences between grade levels in mean clause length in the writing done in response to a narrative assignment written by F.3, F.5 and F.7 students.

5c: There will be no significant differences between grade levels in mean number of clauses per T-unit in the writing done in response to a narrative assignment written by F.3, F.5 and F.7 students.

Ho 6a: There will be no significant differences between grade levels in mean T-unit length in the writing done in response to an expository assignment written by F.3, F.5 and F.7 students.

6b: There will be no significant differences between grade levels in mean clause length in the writing done in response to an expository assignment written by F.3, F.5 and F.7 students.

6c: There will be no significant differences between grade levels in mean number of clauses per T-unit in the writing done in response to an expository assignment written by F.3, F.5 and F.7 students.

Ho 7a: There will be no significant differences in mean T-unit

length between the writing done in response to a narrative assignment and the writing done in response to an expository assignment written by the F.3 students.

7b: There will be no significant differences in mean clause length between the writing done in response to a narrative assignment and the writing done in response to an expository assignment written by the F.3 students.

7c: There will be no significant differences in mean number of clauses per T-unit between the writing done in response to a narrative assignment and the writing done in response to an expository assignment written by the F.3 students.

Ho 8a: There will be no significant differences in mean T-unit length between the writing done in response to a narrative assignment and the writing done in response to an expository assignment written by the F.5 students.

8b: There will be no significant differences in mean clause length between the writing done in response to a narrative assignment and the writing done in response to an expository assignment written by the F.5 students.

8c: There will be no significant differences in mean number of clauses per T-unit between the writing done in response to a narrative assignment and the writing done in response to an expository assignment written by the F.5 students.

Ho 9a: There will be no significant differences in mean T-unit length between the writing done in response to a narrative assignment and the writing done in response to an expository assignment written by the F.7 students.

9b: There will be no significant differences in mean clause length between the writing done in response to a narrative assignment and the writing done in response to an expository assignment written by the F.7 students.

9c: There will be no significant differences in mean number of clauses per T-unit between the writing done in response to a narrative assignment and the writing done in response to an expository assignment written by the F.7 students.

These null hypotheses were tested at a .05 level of significance.

Instructions to student

Composition 1

Events that make us feel most deeply we will always remember. Is there an event i. your life?

It may be a traumatic event, like a fire that bui. home or the death of someone dear to you. It may be an ev. that you witnessed: like watching someone being caught in the act of shop-lifting. If you have such an experience, describe it in this composition so that others may share with you the horror, the sadness, or the shock that you felt because of the event.

In your writing, concentrate on bringing out the feelings you had at that time so that you may turn your experience into something well worth sharing with other people.

Instructions to studen*

Composition 2

Are you an ideal student, i.e. the best
whom all teachers like to have? Before answering
tion, you must know how teachers expect an ideal stu

Different teachers may have different expectations
there are certain qualities which all teachers like their students to possess: being honest, hard-working, helpful and ready to take initiative. An ideal student is someone who has these qualities plus other good qualities.

In this composition, share with others your ideas of an ideal person. You may write about an ideal father, an ideal friend, an ideal teacher, an ideal school principal or an ideal governor for Hong Kong.

Explain what qualities you think the ideal person you have in mind should possess. Try to give concrete examples: e.g. instead of just commenting that an ideal friend should be helpful, suggest some occasions where he should be ready to help. Also explain why you think your ideal person should possess the qualities that you suggest.

Prewriting sessions for composition 1
*(H) indicates that the students are to prepare the work at home.

Session 1 (suggested duration: 2 min.)
a. Distribute the writing instructions to the students.
b. (H) Ask students to read over the instructions and be prepared to discuss it for next day.

Session 2 (suggested duration: 7-10 min.)
a. Discuss briefly with students that they are expected to write about an event in which they were emotionally involved.
b. Ask students to suggest examples of emotional involvement. (e.g. being angry, sad, shocked, frightened, embarrassed, surprised, horrified, shameful, happy....)
c. (H) Ask students to think about an emotional event which they have experienced and two other events (real or imaginative) that involve one's emotions deeply.
Ask them to bring the list to class the next day.
(Some examples can be suggested to guide them: e.g. the death of a pet, being caught cheating in exam, a family member or a relative's escape from China to Hong Kong, a gang fighting one has witnessed....)

Session 3 (suggested duration: 10-15 min.)
a. Divide students into groups of 4. Ask them to share their list with other group members.
b. Ask each group to choose from their lists the event that seems to be of the greatest interest and tell the class.
c. Ask each student to decide for himself which event he will write on. He can choose any event suggested if he feels that he can write it in an interesting way whether he has experienced it or not.
d. (H) Ask each student to think of tne words or expressions which will be useful in writing the event.
(e.g. if the event is a fire: fire engines, sirens wailing, people screaming, blackened, burnt to ashes, water jets, confusion, houses collapsing, flooded with water, temporary shelter.)
Ask students to bring the list to class the next day.

Session 4 (suggested duration: 10-15 min.)
a. Divide students into the same grouping as session 3.
b. Each group member, in turn, shares his list of words with other members who should add more words and expressions to the list.
c. (H) Ask students to think over how they would use the words and expressions in their compositions.
Ask them to think over how they would organize the details.

Session 5 (suggested duration: 15 min.)
a. Ask students to write a rough draft. The draft may be an outline, the first paragraph, or just rough notes on how they will write.
b. Collect the drafts from students. Tell them that they will be given back the drafts the next day.

Actual writing session (40 min.)
a. Give back the drafts to students.
b. Ask them to write the composition working from their drafts.

Prewriting sessions for composition 2
*(H) indicates that the students are to prepare the work at home.

Session 1 (suggested duration: 2 min.)
a. Distribute the writing instructions to students.
b. (H) Ask students to read over the instructions and be prepared to discuss it for next day.

Session 2 (suggested duration: 7-10 min.)
a. Clarify with students the concept of 'ideal'.
b. Ask students to suggest more qualities that an ideal student should possess.
c. (H) Ask students to think about which ideal person they are going to write. Ask them to think about all words that would describe the ideal person.
Ask them to bring the list of words to class the next day.

Session 3 (suggested duration: 10-15 min.)
a. Divide students into groups of 4.
b. Ask students to share their lists with other group members who should contribute more words and expressions to the list.
c. (H) Ask students to think about 5 details that will bring out or explain the qualities that the ideal person should possess. (e.g. An ideal father should be loving but not indulging. If he indulges his children and allows them to do whatever they want, they may become spoilt.)

Session 4 (suggested duration: 10-15 min.)
a. Divide students into the same grouping as sepsion 3.
b. Ask students to share their best three ideas with other group members.
c. Ask each group to share the best detail with the class.
d. (H) Ask students to think over how they would use the words and details in their compositions.

Session 5 (suggested duration: 15 min.)
a. Ask students to write a rough draft. The draft may be an outline, the first paragraph, or just rough notes on how they will write.
b. Collect the drafts from students. Tell them that they will be given back the drafts the next day.

Actual writing session (40 min.)
a. Give back the drafts to students.
b. Ask them to write the composition working from their drafts.

October 27, 1982.

To all teachers concerned:

Dear colleague,

I am happy that your help can be enlisted in this project.

The aim of this project is to collect a sample of student writing which is written in two different modes, the narrative mode and the expository mode. I intend to make cross grade comparisons of the students' skill in writing. To this end, we must ensure that all the compositions are written under similar conditions and that these conditions are conducive to producing the best kind of writing from the students.

The most recent research in writing has indicated that the best way of bringing out students' skill in writing is to immerse them in the writing topic well in advance of the writing session so that before they actually write, they have already generated the ideas about the composition. Then they can concentrate on how to express their ideas instead of struggling to find something to write about.

A useful procedure to immerse students in their topic is to conduct several 'prewriting' sessions before they are asked to write the composition. These 'prewriting' sessions are short sessions (five to fifteen minutes in duration) where we help the students to identify what they are going to write, how they are going to approach the writing task, and to probe deeper and expand further any ideas they have about the topic. The essence of these sessions is to engage students in thinking about their topic well before they do the writing.

I have devised a list of procedures to follow in the 'prewriting' sessions for the two compositions which are outlined in the following two pages. Similar procedures have been used in schools in British Columbia and have been proved to be successful in eliciting good writing from students. I am sure that they will be useful to students in Hong Kong, too.

In the actual writing sessions, students are given forty minutes to complete the task. I have not specified how many words they should write because fluency in expressing their ideas is also one area I would investigate. Please encourage students to write as long as they can (but not less than 200 words). Your prodding may be essential for the students to produce the required length.

To make the project successful, your cooperation in carrying out these procedures as specified is imperative so that

there will be uniformity in the conditions under which all students do the writing. After each prewriting and writing sessions, I would like you to comment on the success (or failure) of the procedures and any difficulties you have in implementing them by filling out the attached writing log.

This project, I hope, when completed will throw light on how students learning English as a second language (ESL) develops skill in writing. It will provide a base for ESL teachers like us to devise means to improve our strategies so that students will produce better writing. Such research may be instrumental in improving methods and materials for teaching ESL.

I look forward to having you try out the procedures and I thank you for your participation in the project.

Yours sincerely,

Margaret Yau.
(Margaret Yau)

Appendix E

A writing log

Composition 1

Initial of teacher:_____ Class:_____

Evaluation \ Session	1	2	3	4	5	6
1. Please fill in the date for each session:						
2. Please indicate duration of each session (in minutes):						
3. Please rate level of student participation on a scale of 1——5 (high——low)						
4. Please rate students' attitude on a scale of 1——5 (favourable——infavourable)						
5. Please rate ease of implementing procedures on a scale of 1——5 (easy——difficult)						
6. Please rate ease for students to follow instructions on a scale of 1——5 (easy——difficult)						

In the space below (and the blank page behind) please comment on particular success or failure encountered (please specify session):

A writing log

Composition 2

Initial of teacher:_____ Class:_____

Evaluation \ Session	1	2	3	4	5	6
1. Please fill in the date for each session:						
2. Please indicate duration of each session (in minutes):						
3. Please rate level of student participation on a scale of 1—5 (high—low)						
4. Please rate students' attitude on a scale of 1—5 (favourable—infavourable)						
5. Please rate ease of implementing procedures on a scale of 1—5 (easy—difficult)						
6. Please rate ease for students to follow instructions on a scale of 1—5 (easy—difficult)						

In the space below (and the blank page behind) please comment on particular success or failure encountered (please specify session):

APPENDIX F

As Gaies (1980) pointed out, second language data may be characterized by the presence of abundant errors making segmentation into T-units difficult. Therefore, a detailed treatment of what constitutes garbles was warranted.

Hunt (1965) defined garbles as "any group of words that cannot be understood..." (p.6). He found that except for a fourth grade boy who committed fourteen garbles totaling 68 words, there were just isolated instances of students writing garbles in the three grades.

O'Donnell et al. (1967) defined garbles as "false starts, abnormal redundancies, and word tangles" (p.39). They found that whereas in speech these were fairly common, in writing they were "fairly rare" (p.40).

In his 1970 study, Hunt simply wrote:

> the writings were screened to exclude extraneous, unintelligible, or inaccurate passages. Where such a passage was found, the whole sentence containing it was deleted (p.13).

By looking at how these two researchers treated garbles, it was difficult to pin down what actually constitutes them. Loban (1976) seemed to have a better treatment of garbles, which he called "mazes," than either Hunt or O'Donnell et al. He defined mazes as:

> a series of words (or initial parts of words), or unattached fragments which do not constitute a communication unit and are not necessary to the communication unit.... When a maze is removed from a communication unit, the remaining material always constitutes a straight forward, clearly recognizable unit of communication (p.10).

However, he still noted that "mazes continue to be one of the more confusing variables encountered..." (p.10).

It was clear from Loban's analysis of the speech sample (in his 1966 report) that non-standard usage would not be considered mazes. He did not include a maze count in the writing sample, nor did he analyze error instances. But from the examples he provided in Appendix D of his 1976 report, it was clear that he included every word (including words in a fragment or words that were actually spelling or lexical errors) into the communication units.

Such a practice was echoed in Hake and Williams (1979) who argued that all fragments should be retained and assigned to whatever sentence they logically connected to, regardless of punctuation or errors, thus providing a more accurate cognitive closure for the preceding T-unit--a closure that is presumably more consistent with the writer's semantic intentions.

However, the standard procedure in most other studies is to delete unintelligible garbles or mazes from the language sample as is described below.

Mellon (1969) deleted garbles but made no analysis of errors though he noted frequent occurrences of such and did not seem to let errors affect the T-unit count.

O'Hare (1973) made a distinction between "garbles" and "fragments." Garbles which were "unintelligible strings of words" were discarded. "Fragments which resulted from the omission of a word counted as a T-unit. The experimenter supplied the missing word" (p.48). He did not report on how he

treated other occurrences of errors.

The studies of Pope (1969) and Huber (1973) comparing the oral and written syntax of Negro and white fourth-grade students both led to the conclusion that the two groups were the same in terms of syntactic development as measured by T-unit length, clause length, number of clauses per T-unit and in the kinds of syntactic operations performed. But there were considerable variations of the Negro group from standard phrase structure rules and from standard morphological rules indicating that they did not conform to conventional usage. From their conclusions, it was clear that the two researchers did not allow non-standard usage to affect the T-unit count.

As reviewed in Chapter Two, some researchers investigating syntactic development of second language learners introduced an error count into the T-unit analysis, and the problems involved in such a procedure were discussed in Chapter Two.

Other second language researchers, on the other hand, either completely ignored the instances of garbles or errors when written samples were analyzed (e.g., Monroe, 1975; Cooper, 1976; Cooper and Morain, 1980) or they deleted garbles but allowed deviant usage of English to be included in the T-unit count (e.g., Crymes, 1971).

Ney and Fillerup (1980) provided a detailed treatment of garbles with second language data. They stated that sentence fragments containing low level errors (e.g., omission of articles or misuse of prepositions, or misplaced adverbs) would be included for T-unit analysis, but sentence fragments that

required major syntactic changes--usually to a verb phrase--in order to make them intelligible would be treated as garbles. They omitted garbled segments, rather than entire sentences, from the analysis whenever it was possible and as long as it did not affect the grammaticality of the sentence in which the garbles occurred.

APPENDIX G

Examples of garbled sentences or garbled segments that were deleted (the garbles are contained within square brackets):

Garbles committed by F.7 students:

1. At that time, I felt [very sorrow and the pain deeper that felt] as if something were cutting me inside.
2. [Four years ago, a day that sun was high and there was hardly a cloud in the sky.] But it was unusual for us.
3. At that afternoon, my sister phoned back and gave us the worst news [that made our family cover of sadness field].
4. It was too dark that I could not see anything [even my fingers].

Garbles committed by F.5 students:

1. [It is difficult drive a car saft is difficulty.]
2. [At that time, I did not know what my feeling of fear, suspicion, pity or whatever.]
3. You should leave him at once. [And sure that carefully next time.]
4. He shall solve all the problems [gave a fair judge].
5. But when you wanted to choose a good friend, you must thought about yourself. [Are you could be a goodself for the others.]
6. The responsibility of a friend is to help the others to trackle the problems, console to the others when they [get something] feel sad or worry, considerate to the others and

share the happiness with everyone.

Garbles committed by F.3 students:

1. How can we become indeal students? [I suggest are showing below.]

2. Peter Cheung is a monitor in my class. [He always help to difficult persons.]

3. He always help the teachers to get [very heavy] some exercise books.

4. I hope she has good qualities and never makes a complaint [or lets hard work as well].

5. [I think that it is an ideal mother do something.]

6. She do not like play majoy because she hate that lould sound. [Although my mother is the kind of quiet.]

7. I knew I'll very frightened, [but no other way].

Appendix H

A sample analysis of two paragraphs:

F.7 Narrative assignment

		N+N[b] N+A CN
5[a]	It was a Sunday morning,/[c]	my elder brother and I
11	was shopping in Tsim Sha Tsui./	We went into a
	N+N AI	N+P
14	watch shop (to look for some watches	designed for
		SAp NG
22	divers./ So concentrated were we	(in choosing the
	AO[d]	N N+A
	watches [that we did not notice	[five solidly-
	N+P	
10	built men had treaded into the	shop./ They pulled
	N+G CP	N
3	out their pistols and shouted,	["Don*t move,/ we are
	N+Pp	
7	robbers."/ Everyone in the shop	was shocked./ The
	N+G CN AI	N+G
14	robbers forced my brother and I	(to place our hands
	N+G	AO
17	on our heads./ I was not so scared	[as the other
	N+A AO N+G	N+N
	customers did [because my brother	was a policeman/
6	and I felt safe with him./	

F.7 Expository assignment

	AI N+A	AI
17	(To be a good leader, one must be	able (to set a
	N+A	
14	good example to the members./	Punctuality is always
	N+Pp	SAp
	important for everyone in a	group, (especially for
	N+R	
18	a leader./ A leader who is always	late for meetings
	CN	
	or activities can never win the	love of the members./

[a]No. of words in a T-unit.

[b]Types of grammatical structures.

[c]Boundary of a T-unit.

[d]Boundary of a clause and its function.

*Word boundary

Appendix I

A table of raw scores
on number of words, T-units and
clauses; and instances of nominal,
adverbial and coordinate structures

NARRATIVE ASSIGNMENT

w	tu	cl	nominal structures											adverbial structures							coordinate structure		
157	15	22	4	7	11	2	0	4	0	0	2	1	0	0	1	0	0	0	0	0	0	9	0	1
152	20	21	2	8	8	0	3	1	0	1	0	0	0	0	1	0	0	0	1	0	1	0	3	1	3
208	29	31	1	5	7	0	0	0	0	1	1	1	0	1	1	0	0	0	1	0	0	5	0	1	3
161	17	23	4	8	6	1	0	3	0	0	0	0	0	0	4	1	0	0	1	0	0	3	0	3	1
228	26	40	0	6	8	1	1	3	0	0	2	0	0	0	7	3	0	0	0	0	0	3	0	1	2
267	24	32	5	9	14	1	0	3	0	0	3	5	0	0	4	0	0	0	0	2	1	2	1	1	4
179	19	28	4	9	4	0	0	2	1	3	3	0	2	2	4	1	0	0	1	0	0	2	5	0	1
148	20	26	0	6	0	0	0	2	1	0	3	1	0	1	0	3	0	0	0	0	0	3	0	1	2
202	25	30	6	3	0	0	0	2	0	0	2	1	0	0	2	1	0	0	4	0	0	3	3	2	2
191	18	21	2	11	14	1	0	3	1	2	0	0	0	0	1	1	0	0	0	0	0	5	11	0	1
188	26	28	6	11	4	0	0	1	2	0	1	2	0	0	1	0	0	0	0	0	0	4	10	0	1
213	25	29	3	9	1	0	1	5	1	1	1	5	0	0	2	0	0	0	1	0	0	3	1	0	6
221	22	25	7	6	6	0	0	6	0	0	1	1	0	2	2	0	0	0	1	0	0	3	8	0	1
207	24	36	1	4	1	1	0	1	0	0	0	2	0	0	5	1	0	0	1	0	0	1	0	0	3
206	21	25	3	5	1	0	0	5	0	0	2	5	0	0	1	2	0	0	0	0	0	3	0	0	4
230	22	30	6	5	1	1	0	2	0	0	3	6	2	0	0	1	0	0	0	0	0	1	1	0	4
214	24	27	8	6	2	0	0	5	0	4	1	0	0	0	1	1	0	0	1	0	0	3	1	0	5
219	30	33	2	5	7	0	0	1	1	0	3	4	2	0	0	0	0	0	0	0	0	1	3	1	4
201	29	36	0	12	8	0	0	1	0	0	4	1	0	0	3	0	0	0	0	0	0	2	1	0	1
228	19	27	12	4	1	1	0	6	0	2	1	1	0	0	3	1	0	0	1	0	0	6	3	0	1

Form 3

305	36	44	2	12	8	0	1	6	0	1	4	5	0	4	2	2	0	0	4	1	0	3	0	0	3
214	25	33	3	5	1	2	0	0	1	3	0	1	0	3	5	0	0	1	1	0	0	2	0	0	2
254	22	36	0	11	8	2	0	0	0	1	7	0	1	0	0	5	0	0	3	1	1	4	0	0	8
219	17	26	2	11	1	2	0	4	0	0	4	1	0	1	3	0	0	0	1	0	1	1	1	0	5
286	32	43	3	2	10	0	1	6	0	2	4	0	1	4	4	4	0	0	2	1	0	2	4	1	2
291	30	46	3	10	7	3	0	0	0	0	6	1	0	3	5	2	0	0	1	1	0	0	1	1	1
237	22	28	4	18	5	2	0	1	0	0	3	4	0	0	1	1	0	0	3	1	0	0	3	1	3
196	20	30	0	5	6	1	0	1	0	0	2	0	1	0	4	2	0	0	1	0	0	2	2	1	0
228	26	33	2	6	5	1	0	3	0	0	2	6	1	0	3	1	0	0	1	7	1	0	0	3	1
217	25	31	3	1	5	1	0	6	0	0	4	1	1	2	1	0	0	1	4	1	0	0	2	1	5
212	14	24	2	8	7	2	0	6	1	4	4	0	0	2	1	0	0	1	1	2	0	0	5	3	0
228	24	32	0	8	14	3	0	4	0	1	4	1	1	1	1	0	0	0	2	2	0	0	1	0	1
279	30	40	0	7	14	1	1	4	1	1	3	1	0	1	3	2	0	0	0	1	0	0	0	1	3
252	27	39	8	5	6	3	0	1	1	0	6	0	0	2	1	2	0	0	0	1	0	0	4	2	9
228	27	35	2	8	5	2	0	3	0	2	1	0	0	7	5	0	0	0	1	1	0	0	5	6	2	8
187	17	25	5	3	6	0	0	0	0	1	3	3	1	4	1	4	0	0	0	0	0	0	4	0	1	1
213	21	28	2	8	3	5	0	8	0	3	1	0	1	2	1	0	0	0	0	1	0	0	4	0	1	1
207	22	28	2	5	2	3	1	5	0	0	2	2	0	1	1	2	0	0	0	0	0	0	2	3	1	1
259	29	37	3	2	14	1	1	3	1	1	3	0	1	3	2	1	0	0	0	2	0	0	2	3	0	2
207	20	27	0	6	9	1	0	1	0	1	1	0	0	3	2	2	0	0	0	0	0	0	2	0	1	2

Form 5

334	30	42	4	16	2	4	0	10	0	3	6	1	1	1	2	1	1	0	1	1	1	2	6	1	2
230	19	26	0	7	4	1	1	2	1	4	1	0	0	1	1	2	0	0	0	1	1	2	2	0	5
257	23	33	6	8	8	1	0	1	0	2	4	0	0	2	0	6	0	1	0	5	1	0	1	1	3
243	22	28	3	19	2	0	0	5	0	2	3	1	0	1	2	2	0	1	1	1	0	3	2	1	3
204	14	24	6	6	3	0	0	1	1	1	4	0	0	0	2	3	0	2	1	2	1	5	0	1	1
233	18	29	3	6	4	0	2	2	0	1	5	0	0	0	4	1	0	0	2	2	0	3	0	2	3
201	22	33	1	3	3	3	1	2	0	1	1	0	0	0	2	4	0	2	1	1	1	1	1	1	2
263	26	36	3	14	11	1	2	8	2	0	5	1	0	0	3	1	1	1	1	0	0	2	2	5	1
208	18	27	3	11	16	0	2	1	0	0	3	0	0	0	2	3	0	0	5	1	1	5	1	0	1
428	34	49	9	19	15	5	2	15	0	2	4	1	0	1	4	4	2	0	5	1	2	3	3	4	4
312	24	38	13	7	14	0	0	7	0	5	6	0	0	2	3	3	1	1	0	2	1	3	3	0	5
182	21	30	2	3	13	1	0	2	0	1	4	1	0	0	2	1	0	0	0	0	0	0	3	0	2
145	14	21	1	3	5	3	0	1	0	1	1	0	0	1	2	2	0	0	0	0	0	0	4	0	2
201	21	32	5	10	7	1	1	2	0	1	3	0	0	0	4	2	0	0	0	1	0	0	0	1	1
193	17	30	0	5	6	0	0	2	0	1	7	1	0	1	4	2	0	0	0	0	1	0	0	1	1
207	16	28	1	3	1	1	0	6	0	1	7	0	1	1	1	3	0	0	0	0	0	1	1	0	3
228	23	33	4	12	10	1	0	3	0	2	7	0	1	2	0	2	0	0	0	0	0	1	4	1	2
237	15	31	3	6	8	4	1	4	0	1	5	2	1	0	3	3	0	0	0	2	0	0	0	0	1
266	31	38	1	1	7	0	0	7	0	0	5	7	0	2	3	0	0	1	1	1	0	0	1	0	7
196	15	22	4	1	9	0	0	7	0	1	3	0	0	0	1	4	1	1	2	1	0	2	1	2	1

Form 7

EXPOSITORY ASSIGNMENT

w	tu	cl	nominal structures											adverbial structures							coordinate structures		
233	21	33	3	8	11	1	0	2	1	0	5	1	0	1	4	1	0	0	0	0	0	1	2	1	8
189	23	28	2	9	1	0	0	1	0	0	2	0	1	0	1	2	0	0	0	1	0	4	0	7	3
174	18	24	1	11	6	0	0	4	0	0	1	1	0	3	2	3	0	0	0	0	0	2	2	2	3
203	17	27	4	5	2	1	0	3	1	0	5	1	0	2	2	2	0	0	0	2	0	3	2	1	6
213	18	26	4	7	3	2	2	4	0	0	2	3	2	0	0	4	0	0	3	0	1	1	5	1	6
292	24	39	1	15	10	3	0	2	0	1	2	0	2	2	5	6	0	0	0	1	1	10	0	2	2
210	21	31	0	14	1	0	0	2	0	1	0	1	0	0	4	6	0	0	1	1	0	4	3	2	2
206	19	25	3	7	4	0	0	2	0	0	0	0	0	0	0	5	0	0	0	0	0	1	1	1	10
174	18	23	8	7	2	1	0	3	0	2	2	1	0	0	0	2	0	0	0	0	0	5	1	3	2
153	17	24	2	7	11	0	2	2	0	1	3	3	0	0	1	3	0	0	0	1	0	1	0	2	2
185	21	28	4	5	1	0	0	0	0	0	1	0	0	0	2	3	0	0	1	0	0	2	3	0	3
187	13	21	2	8	15	0	0	2	0	0	1	4	0	0	0	7	0	0	0	0	1	4	1	0	5
164	15	19	0	7	2	0	0	3	0	0	1	2	0	0	1	2	0	0	0	0	0	1	1	0	10
220	18	24	3	14	6	0	1	4	0	0	3	1	1	1	2	1	0	0	2	0	0	3	7	6	7
153	14	21	0	11	3	1	0	3	0	0	2	1	0	1	0	5	0	0	0	0	0	1	0	4	2
186	12	17	3	6	8	0	0	3	0	0	2	2	0	1	1	2	0	0	0	0	0	5	8	7	3
185	14	24	2	7	7	1	0	2	0	0	1	1	0	0	1	7	0	0	1	1	0	2	6	1	3
141	12	17	1	7	1	1	1	1	0	0	1	2	0	0	1	2	0	0	0	3	0	2	1	1	6
109	16	16	3	6	2	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	4	1	2	0
165	14	15	4	12	3	0	0	7	0	1	0	0	0	0	1	0	0	0	4	2	0	3	0	4	2

Form 3

245	28	35	2	15	8	2	0	3	0	0	0	0	0	3	2	3	0	0	9	2	2	2	0	0	0
248	23	34	6	10	5	1	0	7	0	1	5	0	0	2	2	4	0	0	1	1	0	0	3	0	5
182	11	16	4	13	12	1	0	1	0	0	3	0	0	2	0	1	0	1	5	0	0	2	10	3	5
199	16	24	0	8	5	2	0	4	0	1	1	0	1	1	1	4	0	0	2	0	0	1	1	3	3
218	18	20	3	16	10	0	0	6	0	1	0	3	0	1	0	2	0	0	1	4	2	1	7	7	4	1
255	18	21	7	21	6	0	0	11	0	6	0	0	0	4	0	2	0	0	1	5	3	0	4	1	1	1
220	21	29	1	13	1	1	0	8	0	0	2	1	0	1	4	1	0	0	0	5	0	0	7	1	3	0
169	17	23	3	7	6	0	0	2	0	1	2	0	0	1	1	3	0	0	0	2	1	1	1	1	3	1
193	20	24	1	15	10	1	0	1	0	0	2	4	1	1	0	1	0	0	0	4	1	2	2	2	4	0
215	17	24	2	4	2	0	1	5	1	0	4	1	0	0	3	0	0	0	0	2	0	0	4	0	5	7
211	12	21	5	11	5	2	0	8	1	1	1	0	0	3	0	6	0	0	0	5	0	1	3	4	0	1
243	19	30	1	11	10	3	0	4	1	0	2	0	0	0	5	2	0	0	0	4	1	0	4	12	2	2
271	21	31	0	16	11	2	0	3	1	3	5	2	0	1	2	1	0	0	0	1	1	0	4	3	3	1
224	14	27	1	5	8	3	0	1	0	1	2	2	1	1	1	7	0	0	0	2	0	3	10	5	5
295	19	41	0	11	9	7	1	5	1	0	5	1	0	9	3	5	0	0	2	1	1	4	6	0	4
215	19	25	0	10	3	0	0	2	0	0	1	4	0	1	1	5	0	0	6	1	0	3	3	0	4
157	11	12	5	10	0	0	0	11	1	4	0	1	0	1	0	1	0	0	3	0	0	2	3	1	3
181	16	27	0	7	9	2	0	0	0	0	3	3	0	0	4	2	0	0	1	1	0	1	2	3	0
219	16	23	4	14	8	1	0	6	0	3	2	0	0	2	1	2	0	0	3	2	0	4	4	2	0
215	19	26	1	8	16	2	0	5	0	0	1	1	0	0	2	2	0	0	0	0	0	3	1	2	4

Form 5

337	27	36	2	16	7	3	1	8	1	0	2	0	1	8	2	2	0	1	2	5	0	5	3	2	3
205	12	23	1	9	2	1	0	6	0	0	4	0	0	1	2	3	0	1	4	2	1	5	8	1	0
243	13	19	1	24	11	3	2	8	2	3	0	0	1	2	0	3	0	0	7	1	1	1	3	1	1
218	20	22	3	19	13	0	0	8	2	0	1	0	0	1	1	1	0	0	4	4	0	3	3	1	1
154	6	16	0	6	7	2	0	6	1	0	4	0	0	3	0	3	0	1	1	1	1	3	3	3	3
236	13	18	4	14	1	1	0	11	0	5	2	0	0	3	0	2	0	0	8	1	1	7	6	1	2
201	14	19	7	10	5	1	1	6	1	2	1	0	0	1	1	0	0	0	0	2	0	4	3	4	3
204	12	16	1	12	13	1	1	2	0	0	0	0	0	4	1	1	0	0	5	4	1	5	6	1	7
195	14	17	0	10	6	0	1	4	2	0	0	0	1	1	2	1	0	0	5	3	1	6	6	1	5
207	15	21	10	19	5	3	0	3	0	2	1	0	0	8	0	2	0	0	6	0	0	3	6	2	1
274	20	30	3	17	3	3	0	6	0	3	3	0	0	1	1	3	0	2	4	3	2	2	2	2	3
212	14	21	0	13	14	2	0	1	2	1	0	6	1	2	1	3	0	2	4	1	0	5	0	4	4
246	22	31	2	5	9	2	0	4	0	1	2	1	1	2	1	4	0	0	4	0	0	4	1	2	4
244	23	33	2	11	11	0	0	3	0	0	2	2	0	1	5	4	0	1	6	2	0	1	1	1	4
198	16	23	0	19	3	1	0	6	0	2	2	2	0	5	0	4	0	1	2	0	0	0	0	0	0
308	17	25	3	19	11	3	0	17	1	5	2	3	0	4	0	3	0	0	8	4	0	2	1	2	4
220	13	17	4	12	8	0	1	7	0	1	1	1	0	3	1	2	0	0	4	0	0	3	2	1	5
214	14	26	2	9	9	1	0	2	0	0	4	1	1	1	1	6	0	0	8	2	1	2	5	1	2
224	12	19	1	6	11	0	0	8	1	0	2	2	0	2	1	5	0	0	4	0	1	6	0	2	4
245	13	22	2	19	6	2	1	10	0	2	3	1	0	3	0	4	0	0	3	1	1	3	4	1	2

Form 7

Appendix J

Results of discriminant analysis on nominal construction across three grade levels

BMDP7M NOMINAL DISCRIMINANT

MEANS

GROUP = VARIABLE	FORM3	FORM5	FORM7	ALL GPS.
28 NNTU	32.64561	24.51881	32.66933	29.94460
29 NATU	82.87642	96.37477	128.09131	102.44749
30 NGTU	54.71536	70.07491	90.10281	71.63103
31 NRTU	5.45946	16.38474	16.35869	12.73430
32 APTU	2.98054	1.41877	5.70630	3.36854
33 PPTU	29.08035	41.58154	63.05943	44.57378
34 NFTU	2.07443	3.01115	5.78916	3.62491
35 PATU	6.13834	11.89565	16.22305	11.41901
36 CLTU	18.51756	25.47113	34.49036	26.15968
37 IFTU	13.80066	12.09517	9.33319	11.74300
38 FSTU	2.32704	2.85843	2.82806	2.67118
39 GRTU	4.53119	17.38528	23.13503	15.01717
COUNTS	20.	20.	20.	60.

STANDARD DEVIATIONS

GROUP = VARIABLE	FORM3	FORM5	FORM7	ALL GPS.
28 NNTU	20.76497	17.00438	22.57976	20.24989
29 NATU	16.76663	36.49817	42.66228	33.82950
30 NGTU	37.97038	35.34674	39.40154	37.61029
31 NRTU	5.93900	11.89964	11.89427	10.30121
32 APTU	5.26039	2.09246	6.05689	4.78664
33 PPTU	17.11026	32.34105	31.93228	28.03790
34 NFTU	2.72474	4.21751	6.87141	4.91351
35 PATU	7.31936	13.96048	12.72784	11.69706
36 CLTU	10.66242	12.28893	20.63553	15.17157
37 IFTU	11.55266	12.62604	13.38536	12.54387
38 FSTU	3.90421	2.92791	4.03830	3.65710
39 GRTU	5.59266	16.96919	15.24941	13.56190

COEFFICIENTS OF VARIATION

GROUP = VARIABLE	FORM3	FORM5	FORM7	ALL GPS.
28 NNTU	0.63607	0.69352	0.69116	0.67625
29 NATU	0.20231	0.37871	0.33306	0.33021
30 NGTU	0.69396	0.50441	0.43730	0.52506
31 NRTU	1.08784	0.72626	0.72709	0.80893
32 APTU	1.76491	1.47484	1.06144	1.42099
33 PPTU	0.58838	0.77777	0.50638	0.62902
34 NFTU	1.31349	1.40063	1.18694	1.35548
35 PATU	1.19240	1.17358	0.78455	1.02435
36 CLTU	0.57580	0.48247	0.59830	0.57996
37 IFTU	0.83711	1.04389	1.43417	1.06820
38 FSTU	1.67776	1.02431	1.42794	1.36910
39 GRTU	1.23426	0.97607	0.65915	0.90309

BMDP7M NOMINAL DISCRIMINANT

WITHIN CORRELATION MATRIX

		NNTU 28	NATU 29	NGTU 30	NRTU 31	APTU 32	PPTU 33	NFTU 34	PATU 35	CLTU 36
NNTU	28	1.00000								
NATU	29	0.24627	1.00000							
NGTU	30	-0.14885	0.17371	1.00000						
NRTU	31	0.17052	0.09306	0.14029	1.00000					
APTU	32	-0.11340	0.11795	0.14760	-0.03299	1.00000				
PPTU	33	0.41557	0.35775	-0.16900	0.18091	-0.10360	1.00000			
NFTU	34	-0.04550	0.17788	0.30267	0.18973	0.06427	0.21960	1.00000		
PATU	35	0.48247	0.38219	-0.23150	0.12224	-0.07002	0.63586	0.05637	1.00000	
CLTU	36	0.01700	0.06337	0.17614	0.29413	-0.24567	0.21468	0.13528	-0.00868	1.00000
IFTU	37	-0.28809	-0.22208	0.22771	-0.15156	-0.14451	-0.19864	-0.05174	-0.27741	-0.01833
FSTU	38	-0.18349	-0.01331	0.05762	0.23028	0.20504	-0.19862	-0.00601	-0.09818	-0.00895
GRTU	39	0.21939	0.32546	0.01386	0.35048	-0.06832	0.29670	0.16751	0.18913	0.21868

		IFTU 37	FSTU 38	GRTU 39
IFTU	37	1.00000		
FSTU	38	0.19511	1.00000	
GRTU	39	-0.14110	-0.14212	1.00000

WITHIN COVARIANCE MATRIX

		NNTU 28	NATU 29	NGTU 30	NRTU 31	APTU 32	PPTU 33	NFTU 34	PATU 35	CLTU 36
NNTU	28	410.06012								
NATU	29	168.70919	1144.43677							
NGTU	30	-113.36452	221.01936	1414.54290						
NRTU	31	35.56967	32.43075	54.35258	106.11564					
APTU	32	-10.99141	19.09910	26.57211	-1.62681	22.91205				
PPTU	33	235.94393	339.33142	-178.21313	52.25130	-13.90405	786.12584			
NFTU	34	-4.52743	29.56712	55.93268	9.60323	1.51153	30.25257	24.14267		
PATU	35	114.27958	151.23450	-101.84564	14.72908	-3.92040	208.53928	3.23967	136.82212	
CLTU	36	5.22385	32.52533	100.50682	45.96880	-17.84070	91.31968	10.08481	-1.54109	230.17737
IFTU	37	-73.17941	-94.23876	107.42832	-19.58487	-8.67680	-69.86234	-3.18874	-40.70336	-3.48829
FSTU	38	-13.58827	-1.64712	7.92478	8.67526	3.58929	-20.36651	-0.10807	-4.19996	-0.49677
GRTU	39	60.25171	149.32057	7.06786	48.86359	-4.43527	112.82011	11.16236	30.00230	44.99466

		IFTU 37	FSTU 38	GRTU 39
IFTU	37	157.34969		
FSTU	38	8.95037	13.37449	
GRTU	39	-24.00464	-7.04881	183.92589

BMDP7M NOMINAL DISCRIMINANT

STEP NUMBER 0

VARIABLE	F TO REMOVE DF= 2 58	FORCE LEVEL	TOLERANCE

VARIABLE	F TO ENTER DF= 2 57	FORCE LEVEL	TOLERANCE
28 NNTU	1.077	1	1.000000
29 NATU	9.415	1	1.000000
30 NGTU	4.452	1	1.000000
31 NRTU	7.481	1	1.000000
32 APTU	4.110	1	1.000000
33 PPTU	7.514	1	1.000000
34 NFTU	3.092	1	1.000000
35 PATU	3.741	1	1.000000
36 CLTU	5.573	1	1.000000
37 IFTU	0.646	1	1.000000
38 FSTU	0.133	1	1.000000
39 GRTU	9.866	1	1.000000

STEP NUMBER 1
VARIABLE ENTERED 39 GRTU

VARIABLE	F TO REMOVE DF= 2 57	FORCE LEVEL	TOLERANCE
39 GRTU	9.866	1	1.000000

VARIABLE	F TO ENTER DF= 2 56	FORCE LEVEL	TOLERANCE
28 NNTU	1.696	1	0.951866
29 NATU	4.412	1	0.894073
30 NGTU	3.217	1	0.999808
31 NRTU	2.658	1	0.877165
32 APTU	4.168	1	0.995332
33 PPTU	3.164	1	0.911969
34 NFTU	1.489	1	0.971940
35 PATU	1.393	1	0.964231
36 CLTU	2.374	1	0.952179
37 IFTU	0.149	1	0.980090
38 FSTU	0.479	1	0.979802

U-STATISTIC OR WILKS' LAMBDA 0.7428429 DEGREES OF FREEDOM 1 2 57
APPROXIMATE F-STATISTIC 9.866 DEGREES OF FREEDOM 2.00 57.00

F - MATRIX DEGREES OF FREEDOM = 1 57

	FORM3	FORM5
FORM5	8.98	
FORM7	18.82	1.80

BMDP7M NONINAL DISCRIMINANT

CLASSIFICATION FUNCTIONS

GROUP = VARIABLE	FORM3	FORM5	FORM7
39 GRTU	0.02464	0.09452	0.12578
CONSTANT	-1.15443	-1.92027	-2.55363

STEP NUMBER 2
VARIABLE ENTERED 29 NATU

VARIABLE	F TO REMOVE	FORCE LEVEL	TOLERANCE
DF=	2 56		
29 NATU	4.412	1	0.894074
39 GRTU	4.787	1	0.894074

VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	2 55		
28 NNTU	1.809	1	0.917664
30 NGTU	1.905	1	0.967787
31 NRTU	2.625	1	0.876671
32 APTU	2.738	1	0.973353
33 PPTU	1.287	1	0.835668
34 NFTU	0.768	1	0.954920
35 PATU	0.446	1	0.849245
36 CLTU	2.080	1	0.952111
37 IFTU	0.001	1	0.945384
38 FSTU	0.398	1	0.978588

U-STATISTIC OR WILKS' LAMBDA 0.6417335
APPROXIMATE F-STATISTIC 6.953
DEGREES OF FREEDOM 2 2 57
DEGREES OF FREEDOM 4.00 112.00

F - MATRIX DEGREES OF FREEDOM = 2 56

	FORM3	FORM5
FORM5	4.46	
FORM7	13.60	4.40

CLASSIFICATION FUNCTIONS

GROUP = VARIABLE	FORM3	FORM5	FORM7
29 NATU	0.07740	0.08039	0.10683
39 GRTU	-0.03820	0.02925	0.03905
CONSTANT	-4.21943	-5.22691	-8.39234

CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP - FORM3	FORM5	FORM7
FORM3	85.0	17	3	0
FORM5	35.0	8	7	5
FORM7	60.0	4	4	12
TOTAL	60.0	29	14	17

BMDP7M NONINAL DISCRIMINANT

GROUP	FORM3	INCORRECT CLASSIFICATIONS	MAHALANOBIS D-SQUARE FROM AND POSTERIOR PROBABILITY FOR GROUP - FORM3	FORM5	FORM7
CASE					
1			0.0 0.521	0.9 0.338	2.6 0.141
2			0.1 0.617	1.7 0.285	3.8 0.098
3		FORM5	1.6 0.284	0.4 0.509	2.2 0.207
4		FORM5	0.4 0.421	0.4 0.427	2.5 0.153
5			0.4 0.651	2.0 0.286	5.1 0.062
6			0.3 0.413	0.6 0.357	1.4 0.230
7		FORM5	0.9 0.329	0.8 0.344	0.9 0.328
8			0.3 0.560	1.2 0.350	3.9 0.091
9			0.9 0.669	2.6 0.285	6.2 0.046
10			0.6 0.553	2.0 0.274	3.0 0.173
11			0.3 0.644	1.9 0.287	4.7 0.069
12			0.4 0.568	1.9 0.278	3.0 0.154
13			0.3 0.473	0.6 0.398	2.9 0.130
14			0.1 0.479	0.8 0.338	2.0 0.183
15			0.3 0.426	0.8 0.342	1.5 0.232
16			0.2 0.489	0.7 0.389	3.0 0.122
17			0.1 0.626	1.7 0.286	4.1 0.088
18			0.1 0.626	1.7 0.286	4.1 0.088
19			0.1 0.618	1.7 0.286	3.8 0.097
20			0.9 0.538	2.2 0.270	2.9 0.192
GROUP	FORM5		FORM3	FORM5	FORM7
CASE					
21			1.7 0.242	0.3 0.499	1.6 0.259
22		FORM3	0.9 0.446	1.0 0.442	3.7 0.112
23		FORM7	6.4 0.084	5.0 0.173	2.0 0.743
24			1.0 0.301	0.6 0.352	0.7 0.347
25			1.0 0.273	0.0 0.448	1.0 0.279
26		FORM7	6.1 0.047	2.9 0.235	0.7 0.718
27		FORM7	3.6 0.303	4.1 0.234	2.7 0.463
28		FORM3	0.3 0.546	1.1 0.361	3.9 0.093
29		FORM3	0.2 0.478	1.0 0.328	2.0 0.194
30		FORM3	3.4 0.573	4.1 0.390	8.9 0.037
31		FORM7	8.0 0.029	3.8 0.233	1.5 0.738
32		FORM3	0.1 0.514	1.0 0.326	2.4 0.160
33		FORM3	0.3 0.419	0.6 0.356	1.5 0.226
34			1.9 0.420	1.6 0.482	4.8 0.098
35			28.3 0.008	19.9 0.529	20.1 0.463
36			4.2 0.190	1.9 0.596	4.0 0.214
37		FORM7	2.3 0.173	1.0 0.326	0.1 0.500
38		FORM3	0.3 0.643	1.9 0.287	4.7 0.070
39			1.8 0.212	0.2 0.480	1.1 0.307
40		FORM3	0.2 0.632	1.7 0.286	4.3 0.081

BMDP7M NOMINAL DISCRIMINANT

GROUP	FORM7	FORM3	FORM5	FORM7
CASE				
41		4.4 0.090	1.3 0.425	1.1 0.486
42	FORM5	0.9 0.289	0.4 0.369	0.6 0.342
43		17.3 0.013	14.8 0.047	8.8 0.939
44		8.8 0.112	8.5 0.135	5.0 0.753
45		11.8 0.015	6.2 0.246	4.0 0.739
46		3.7 0.106	1.7 0.279	0.2 0.615
47	FORM3	0.0 0.479	0.6 0.365	2.3 0.156
48		6.7 0.040	3.3 0.218	0.9 0.743
49		2.2 0.312	2.5 0.275	1.7 0.413
50		22.4 0.002	14.6 0.091	10.0 0.907
51	FORM5	1.0 0.285	0.5 0.360	0.6 0.354
52	FORM5	1.3 0.228	0.1 0.414	0.4 0.358
53	FORM3	1.9 0.531	2.4 0.409	6.2 0.061
54	FORM3	0.2 0.414	0.4 0.372	1.5 0.214
55		5.7 0.052	2.7 0.244	0.5 0.703
56		4.2 0.082	1.4 0.330	0.2 0.588
57		5.6 0.054	2.4 0.261	0.5 0.685
58	FORM3	0.4 0.420	0.8 0.339	1.5 0.242
59	FORM5	3.8 0.288	2.4 0.586	5.5 0.127
60		4.8 0.084	2.8 0.229	0.6 0.688

EIGENVALUES

0.48560 0.04893

CUMULATIVE PROPORTION OF TOTAL DISPERSION

0.90847 1.00000

CANONICAL CORRELATIONS

0.57173 0.21597

VARIABLE	COEFFICIENTS FOR CANONICAL VARIABLES	
29 NATU	-0.01766	0.02579
39 GRTU	-0.04650	-0.06260
CONSTANT	2.50790	-1.70231

GROUP	CANONICAL VARIABLES EVALUATED AT GROUP MEANS	
FORM3	0.83326	0.15166
FORM5	-0.00284	-0.30489
FORM7	-0.83043	0.15322

BMDP7M NOMINAL DISCRIMINANT

POINTS TO BE PLOTTED

GROUP	MEAN COORDINATES		SYMBOL FOR CASES	SYMBOL FOR MEAN
FORM3	0.83	0.15	A	1
FORM5	-0.00	-0.30	B	2
FORM7	-0.83	0.15	C	3

GROUP FORM3

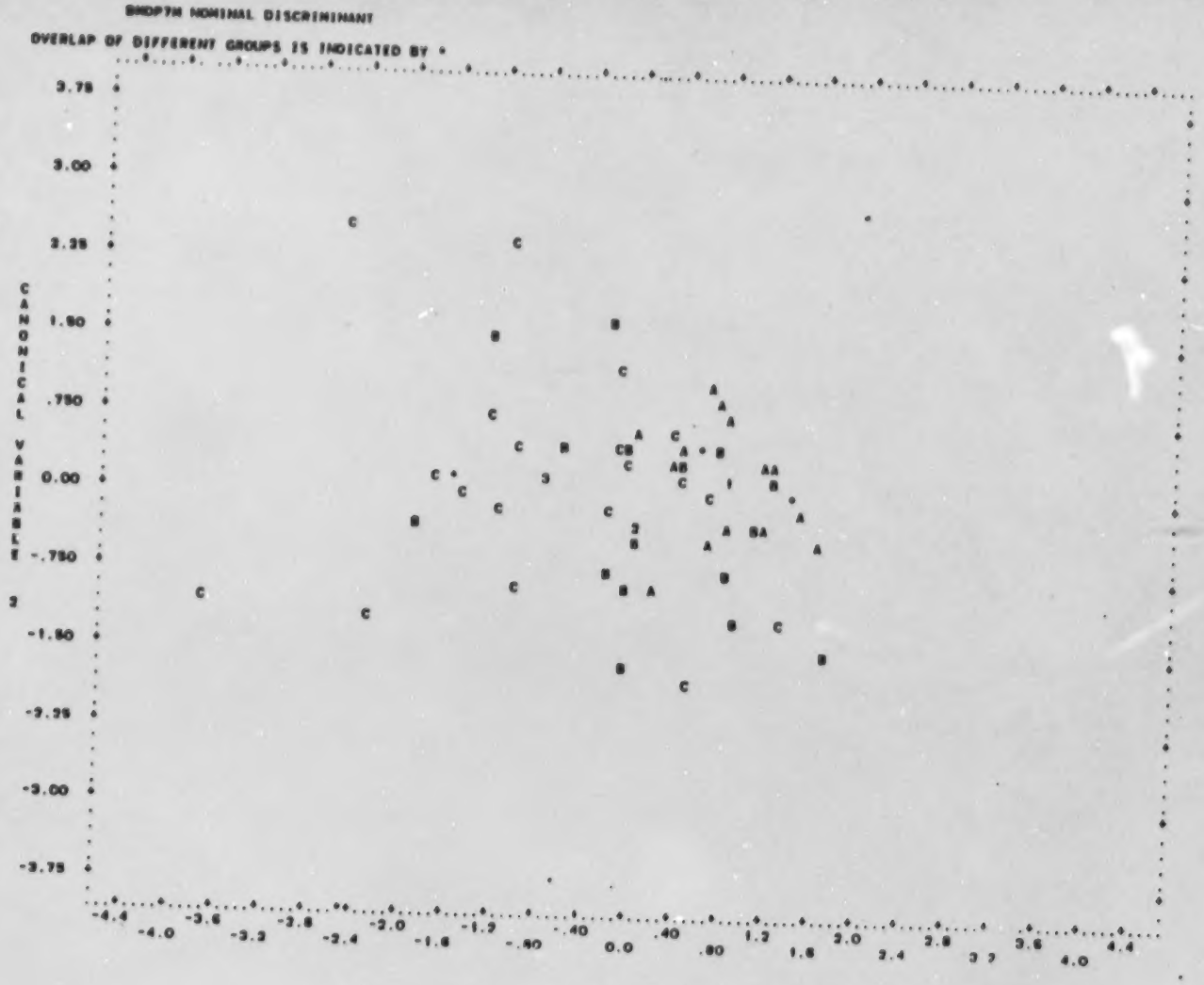
CASE	X	Y	CASE	X	Y
1	0.79	0.19	11	1.34	0.00
2	1.11	0.34	12	0.78	0.81
3	0.19	-0.94	13	0.78	-0.36
4	0.61	-0.47	14	0.58	0.39
5	1.41	-0.10	15	0.37	0.49
6	0.35	0.36	16	0.84	-0.35
7	0.00	0.58	17	1.18	0.23
8	1.09	-0.29	18	1.18	0.23
9	1.61	-0.39	19	1.11	0.33
10	0.70	0.94	20	0.62	1.05

GROUP FORM5

CASE	X	Y	CASE	X	Y
21	-0.04	-0.83	31	-1.95	-0.32
22	0.83	-0.82	32	0.70	0.39
23	-1.31	1.50	33	0.37	0.36
24	-0.08	0.50	34	0.87	-1.21
25	-0.01	-0.38	35	-2.45	-4.03
26	-1.64	0.15	36	-0.07	-1.69
27	-0.25	1.71	37	-0.64	0.46
28	1.07	-0.36	38	1.33	0.01
29	0.54	0.51	39	-0.22	-0.70
30	1.65	-1.49	40	1.23	0.16

GROUP FORM7

CASE	X	Y	CASE	X	Y
41	-1.01	-0.86	51	-0.13	0.41
42	-0.10	0.33	52	-0.27	-0.13
43	-2.56	2.56	53	1.31	-1.13
44	-1.14	2.38	54	0.40	0.19
45	-2.34	-1.15	55	-1.56	0.16
46	-1.06	0.49	56	-1.18	-0.20
47	0.67	0.04	57	-1.52	0.04
48	-1.76	0.18	58	0.33	0.54
49	-0.17	1.27	59	0.49	-1.78
50	-3.74	-1.07	60	-1.26	0.79


BMDP7M NONIMAL DISCRIMINANT
OVERLAP OF DIFFERENT GROUPS IS INDICATED BY *
CANONICAL VARIABLE 2
3.75
3.00
2.25
1.50
.750
0.00
-.750
-1.50
-2.25
-3.00
-3.75
-4.4
-4.0
-3.6
-3.2
-2.8
-2.4
-2.0
-1.6
-1.2
-.80
-.40
0.0
.40
.80
1.2
1.6
2.0
2.4
2.8
3.2
3.6
4.0
4.4

Appendix K

Results of discriminant analysis on adverbial construction across three grade levels

BMDP7M ADVERBIAL DISCRIMINANT

MEANS

GROUP = VARIABLE	FORM3	FORM5	FORM7	ALL GPS.
20 CLTTU	17.19820	18.17740	17.14731	17.50763
21 CLOTU	22.68649	23.58884	31.95741	26.07758
22 SAITU	0.0	0.0	1.78299	0.59433
23 SAATU	0.0	1.75955	5.68812	2.48256
24 SACTU	6.53758	25.15285	36.60464	22.76501
25 SAPTU	4.28427	8.36734	16.44688	9.69950
26 SAOTU	1.32906	3.13025	6.75744	3.73892
27 ANFTU	29.21565	26.92781	36.21347	30.78564
COUNTS	20.	20.	20.	60.

STANDARD DEVIATIONS

GROUP = VARIABLE	FORM3	FORM5	FORM7	ALL GPS.
20 CLTTU	11.82889	9.48684	8.87429	10.14352
21 CLOTU	16.04094	17.65050	17.04990	16.92677
22 SAITU	0.0	0.0	3.22113	1.85972
23 SAATU	0.0	2.94033	7.42935	4.61305
24 SACTU	8.63409	16.13069	21.37920	16.24619
25 SAPTU	6.82041	5.99040	10.95952	8.21612
26 SAOTU	2.80180	4.53391	6.30218	4.76529
27 ANFTU	12.42142	14.11524	23.80600	17.51434

COEFFICIENTS OF VARIATION

GROUP = VARIABLE	FORM3	FORM5	FORM7	ALL GPS.
20 CLTTU	0.68780	0.52190	0.51753	0.57938
21 CLOTU	0.70707	0.74826	0.53352	0.64909
22 SAITU	0.0	0.0	1.80659	3.12910
23 SAATU	0.0	1.67107	1.30612	1.85819
24 SACTU	1.32069	0.64131	0.58406	0.71365
25 SAPTU	1.59187	0.71593	0.66636	0.84707
26 SAOTU	2.10811	1.44842	0.93263	1.27451
27 ANFTU	0.42516	0.52419	0.65738	0.56891

BMDP7M ADVERBIAL DISCRIMINANT

WITHIN CORRELATION MATRIX

		CLTTU 20	CLOTU 21	SAITU 22	SAATU 23	SACTU 24	SAPTU 25	SAOTU 26	ANFTU 27
CLTTU	20	1.00000							
CLOTU	21	-0.23138	1.00000						
SAITU	22	-0.02301	0.01154	1.00000					
SAATU	23	-0.12752	0.29923	0.00266	1.00000				
SACTU	24	-0.15396	0.12704	-0.19974	-0.16337	1.00000			
SAPTU	25	-0.02070	0.06546	-0.20116	0.27467	0.17333	1.00000		
SAOTU	26	-0.00223	0.37098	0.03229	0.47504	0.22371	0.30667	1.00000	
ANFTU	27	-0.00536	0.23894	-0.29423	0.29866	0.31576	0.26122	0.34278	1.00000

WITHIN COVARIANCE MATRIX

		CLTTU 20	CLOTU 21	SAITU 22	SAATU 23	SACTU 24	SAPTU 25	SAOTU 26	ANFTU 27
CLTTU	20	102.89203							
CLOTU	21	-39.72757	286.51740						
SAITU	22	-0.43414	0.36315	3.45857					
SAATU	23	-5.96710	23.36528	0.02285	21.28029				
SACTU	24	-25.37133	34.93514	-6.03480	-12.24406	263.93954			
SAPTU	25	-1.72556	9.10427	-3.07368	10.41027	23.13593	67.50469		
SAOTU	26	-0.10781	29.92346	0.28612	10.44258	17.31937	12.00668	22.70805	
ANFTU	27	-0.95247	70.83820	-9.58356	24.13043	89.84760	37.59030	28.60842	306.75335

STEP NUMBER 0

VARIABLE	F TO REMOVE	FORCE LEVEL	TOLERANCE
	DF= 2 58		

VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
	DF= 2 57		
20 CLTTU	0.066	1	1.000000
21 CLOTU	1.824	1	1.000000
22 SAITU	6.128	1	1.000000
23 SAATU	7.970	1	1.000000
24 SACTU	17.450	1	1.000000
25 SAPTU	11.351	1	1.000000
26 SAOTU	6.733	1	1.000000
27 ANFTU	1.526	1	1.000000

BMDP7M ADVERBIAL DISCRIMINANT

STEP NUMBER 1
VARIABLE ENTERED 24 SACTU

VARIABLE	F TO REMOVE DF= 2 57	FORCE LEVEL	TOLERANCE
24 SACTU	17.450	1	1.000000

VARIABLE	F TO ENTER DF= 2 56	FORCE LEVEL	TOLERANCE
20 CLFTU	0.343	1	0.976297
21 CLOTU	0.760	1	0.983861
22 SAITU	7.298	1	0.960104
23 SAATU	7.911	1	0.973309
25 SAPTU	4.998	1	0.969958
26 SAOTU	2.210	1	0.949953
27 ANFTU	1.225	1	0.900295

U-STATISTIC OR WILKS' LAMBDA 0.6202433
APPROXIMATE F-STATISTIC 17.450

DEGREES OF FREEDOM 1 2 57
DEGREES OF FREEDOM 2.00 57.00

F - MATRIX DEGREES OF FREEDOM = 1 57

	FORM3	FORM5
FORM5	13.13	
FORM7	34.25	4.97

CLASSIFICATION FUNCTIONS

GROUP = VARIABLE	FORM3	FORM5	FORM7
24 SACTU	0.02477	0.09530	0.13869
CONSTANT	-1.17958	-2.28712	-3.63688

BMDP7M ADVERBIAL DISCRIMINANT

STEP NUMBER 2
VARIABLE ENTERED 23 SAATU

VARIABLE	F TO REMOVE	FORCE LEVEL	TOLERANCE
DF=	2 56		
23 SAATU	7.911	1	0.973309
24 SACTU	17.245	1	0.973309

VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	2 55		
20 CLTTU	0.741	1	0.952349
21 CLOTU	0.336	1	0.878663
22 SAITU	6.045	1	0.959182
25 SAPTU	1.628	1	0.875641
26 SAOTU	0.194	1	0.681053
27 ANFTU	2.518	1	0.774255

U-STATISTIC OR WILKS' LAMBDA 0.4836054
APPROXIMATE F-STATISTIC 12.264

DEGREES OF FREEDOM 2 2 57
DEGREES OF FREEDOM 4.00 112.00

F - MATRIX DEGREES OF FREEDOM = 2 56

	FORM3	FORM5
FORM5	8.08	
FORM7	28.72	7.16

CLASSIFICATION FUNCTIONS

GROUP = VARIABLE	FORM3	FORM5	FORM7
23 SAATU	0.01464	0.14129	0.35661
24 SACTU	0.02545	0.10185	0.15523
CONSTANT	-1.18180	-2.50385	-4.95387

STEP NUMBER 3
VARIABLE ENTERED 22 SAITU

VARIABLE	F TO REMOVE	FORCE LEVEL	TOLERANCE
DF=	2 55		
22 SAITU	6.045	1	0.959182
23 SAATU	6.628	1	0.972374
24 SACTU	18.776	1	0.933587

VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	2 54		
20 CLTTU	0.831	1	0.948785
21 CLOTU	0.353	1	0.876383
25 SAPTU	2.390	1	0.849873
26 SAOTU	0.229	1	0.672090
27 ANFTU	2.127	1	0.723624

U-STATISTIC OR WILKS' LAMBDA 0.3964562
APPROXIMATE F-STATISTIC 10.783

DEGREES OF FREEDOM 3 2 57
DEGREES OF FREEDOM 6.00 110.00

F - MATRIX DEGREES OF FREEDOM = 3 55

	FORM3	FORM5
FORM5	5.49	
FORM7	25.15	8.96

BMDP7M ADVERBIAL DISCRIMINANT

CLASSIFICATION FUNCTIONS

VARIABLE	GROUP = FORM3	FORM5	FORM7
22 SAITU	0.04619	0.18431	0.81739
23 SAATU	0.01522	0.14358	0.36676
24 SACTU	0.02653	0.10617	0.17439
CONSTANT	-1.18534	-2.56019	-6.06210

CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP - FORM3	FORM5	FORM7
FORM3	95.0	19	1	0
FORM5	50.0	7	10	3
FORM7	65.0	0	7	13
TOTAL	70.0	26	18	16

INCORRECT CLASSIFICATIONS

MAHALANOBIS D-SQUARE FROM AND POSTERIOR PROBABILITY FOR GROUP -

GROUP	CASE	FORM3	FORM5	FORM7
FORM3	1			
	2	0.2 0.793	2.9 0.201	9.9 0.006
	3	0.0 0.718	2.0 0.270	8.3 0.011
	4	0.0 0.743	2.2 0.247	8.8 0.009
	5	0.0 0.703	1.8 0.284	8.0 0.013
	6	0.4 0.489	0.5 0.467	5.2 0.044
	7	0.2 0.793	2.9 0.201	9.9 0.006
	8	0.0 0.627	1.2 0.352	6.8 0.021
	9	0.2 0.793	2.9 0.201	9.9 0.006
	10	0.4 0.504	0.6 0.455	5.4 0.041
	11	0.2 0.793	2.9 0.201	9.9 0.006
	12	0.0 0.722	2.0 0.267	8.4 0.011
	13	0.0 0.734	2.1 0.255	8.6 0.010
	14	0.0 0.726	2.0 0.264	8.4 0.011
	15	0.3 0.519	0.6 0.443	5.5 0.038
	16	0.2 0.793	2.9 0.201	9.9 0.006
	17	0.2 0.793	2.9 0.201	9.9 0.006
	18	0.1 0.601	1.0 0.374	6.5 0.024
	19	0.2 0.793	2.9 0.201	9.9 0.006
	20	0.2 0.793	2.9 0.201	9.9 0.006
FORM5		3.0 0.170	0.4 0.637	2.8 0.193

GROUP	CASE	FORM3	FORM5	FORM7
	21			
	22	5.5 0.074	1.3 0.587	2.4 0.338
FORM3	23	0.8 0.519	1.2 0.426	5.3 0.055
FORM7	24	17.4 0.001	8.4 0.072	3.3 0.927
	25	0.6 0.453	0.4 0.495	4.9 0.052
	26	4.0 0.104	0.8 0.519	1.4 0.377
	27	4.6 0.080	0.9 0.492	1.2 0.428
	28	3.9 0.126	0.7 0.630	2.6 0.214
FORM3	29	0.4 0.487	0.5 0.468	5.2 0.044
FORM7	30	8.1 0.021	2.3 0.357	1.2 0.623
	31	1.8 0.265	0.2 0.612	3.4 0.123
FORM7	32	11.1 0.006	4.3 0.193	1.4 0.801
	33	0.9 0.396	0.3 0.536	4.4 0.068
FORM3	34	0.0 0.722	2.0 0.267	8.4 0.011
FORM3	35	0.0 0.739	2.2 0.251	8.7 0.010
FORM3	36	0.2 0.541	0.7 0.425	5.8 0.034
	37	2.5 0.202	0.3 0.633	3.0 0.164
FORM3	38	1.7 0.274	0.2 0.608	3.4 0.118
	39	0.3 0.518	0.6 0.444	5.5 0.038
FORM3	40	0.6 0.445	0.4 0.501	4.8 0.054
		0.2 0.793	2.9 0.201	9.9 0.006

BMDP7M ADVERBIAL DISCRIMINANT

POINTS TO BE PLOTTED

GROUP	MEAN COORDINATES		SYMBOL FOR CASES	SYMBOL FOR MEAN
FORM3	1.33	0.19	A	1
FORM5	0.13	-0.33	B	2
FORM7	-1.47	0.14	C	3

GROUP FORM3

CASE	X	Y	CASE	X	Y
1	1.67	0.40	11	1.42	0.25
2	1.41	0.24	12	1.46	0.27
3	1.49	0.29	13	1.44	0.26
4	1.37	0.21	14	0.87	-0.09
5	0.80	-0.14	15	1.67	0.40
6	1.67	0.40	16	1.67	0.40
7	1.15	0.08	17	1.08	0.04
8	1.67	0.40	18	1.67	0.40
9	0.84	-0.12	19	1.67	0.40
10	1.67	0.40	20	-0.10	-0.69

GROUP FORM5

CASE	X	Y	CASE	X	Y
21	-0.59	-1.00	31	-1.78	-0.87
22	0.73	0.31	32	0.57	-0.28
23	-2.57	-1.11	33	1.42	0.25
24	0.71	-0.19	34	1.48	0.28
25	-0.52	-0.28	35	0.93	-0.06
26	-0.66	-0.36	36	0.02	-0.62
27	-0.29	-0.81	37	0.25	-0.48
28	0.80	-0.14	38	0.87	-0.09
29	-1.27	-0.95	39	0.69	-0.20
30	0.22	-0.50	40	1.67	0.40

GROUP FORM7

CASE	X	Y	CASE	X	Y
41	-0.30	1.48	51	-2.34	1.96
42	-1.13	-0.31	52	-1.63	0.10
43	-2.83	-1.85	53	0.72	-0.19
44	-0.19	-0.19	54	-0.24	-0.25
45	-3.49	0.98	55	-3.09	4.74
46	-2.13	-1.95	56	-0.79	-1.12
47	0.29	0.65	57	0.06	-0.59
48	-2.28	0.56	58	-2.01	-1.88
49	-1.65	-1.65	59	-0.82	-0.74
50	-2.85	0.87	60	-2.61	2.26

BMDP7M ADVERBIAL DISCRIMINANT

GROUP	FORM7		FORM3	FORM5	FORM7
CASE					
41			4.4 0.232	3.6 0.352	3.3 0.416
42			7.3 0.032	2.6 0.336	1.3 0.632
43			21.7 0.000	11.3 0.068	6.0 0.932
44		FORM5	2.7 0.178	0.4 0.570	2.0 0.253
45			50.0 0.000	41.0 0.006	30.9 0.993
46			17.7 0.002	8.9 0.189	6.0 0.809
47		FORM5	3.9 0.395	3.6 0.461	5.9 0.144
48			14.3 0.002	7.7 0.052	1.9 0.946
49			13.2 0.008	5.8 0.301	4.1 0.691
50			23.9 0.000	16.3 0.019	8.4 0.981
51			17.8 0.002	12.6 0.025	5.2 0.973
52			13.3 0.010	7.8 0.161	4.6 0.828
53		FORM5	0.6 0.457	0.4 0.492	4.9 0.051
54		FORM5	2.9 0.162	0.3 0.570	1.8 0.269
55			45.5 0.000	41.4 0.002	29.0 0.998
56		FORM5	6.7 0.051	1.9 0.543	2.5 0.406
57		FORM5	2.4 0.215	0.2 0.630	3.0 0.155
58			16.6 0.003	8.1 0.213	5.5 0.784
59		FORM5	5.5 0.054	1.1 0.489	1.2 0.457
60			21.0 0.001	15.4 0.014	7.0 0.985

EIGENVALUES

1.38107	0.05933

CUMULATIVE PROPORTION OF TOTAL DISPERSION

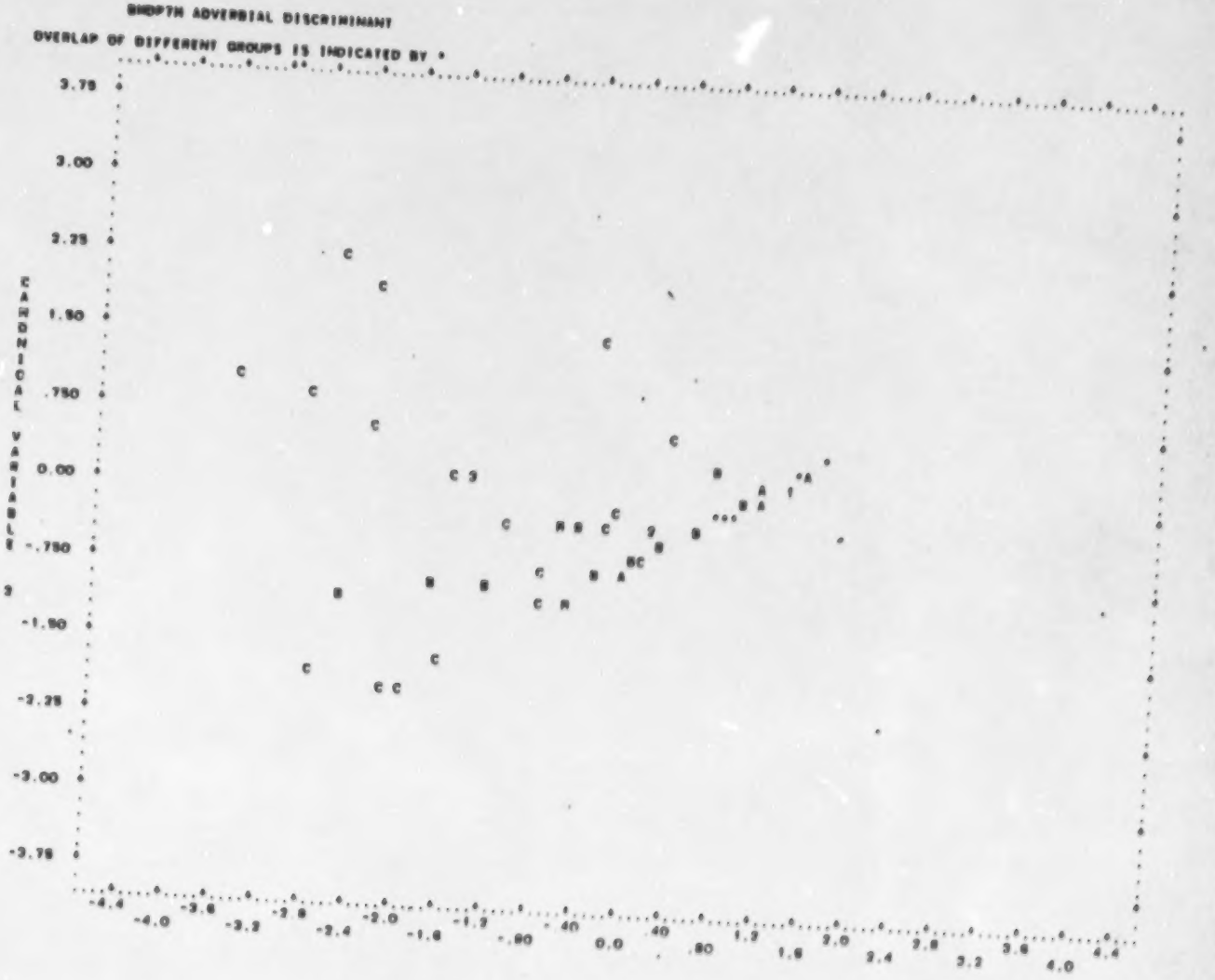
0.95881	1.00000

CANONICAL CORRELATIONS

0.76159	0.23667

VARIABLE	COEFFICIENTS FOR CANONICAL VARIABLES	
22 SAITU	-0.28237	0.37973
23 SAATU	-0.12648	0.04368
24 SACTU	-0.05232	-0.03239
CONSTANT	1.67292	0.40314

GROUP	CANONICAL VARIABLES EVALUATED AT GROUP MEANS	
FORM3	1.33087	0.19141
FORM5	0.13433	-0.33460
FORM7	-1.46520	0.14319


BMDP7M ADVERBIAL DISCRIMINANT
OVERLAP OF DIFFERENT GROUPS IS INDICATED BY *
CANONICAL VARIABLE 2
3.75
3.00
2.25
1.50
.750
0.00
-.750
-1.50
-2.25
-3.00
-3.75
-4.4
-4.0
-3.6
-3.2
-2.8
-2.4
-2.0
-1.6
-1.2
-.80
-.40
0.0
.40
.80
1.2
1.6
2.0
2.4
2.8
3.2
3.6
4.0
4.4

Appendix L

Results of discriminant analysis on nominal construction between two modes of writing

BMDP7M NONI.MODE DISCRIMINANT

MEANS

VARIABLE	GROUP = NARRAT	EXPOSI	ALL GPS.
41 NNGN	44.63304	45.20073	44.91689
42 NAGN	99.64052	207.70190	153.67122
43 NGGN	88.12291	126.77016	107.44653
44 NRGN	16.27165	21.93123	19.10144
45 APGN	4.85550	5.25011	5.05280
46 PPGN	45.17574	88.54561	66.86067
47 NFGN	3.62854	7.24620	5.43737
48 PAGN	16.54985	17.70718	17.12851
49 CLGN	43.09517	35.38390	39.23953
50 IFGN	13.97403	21.25497	17.61450
51 FSGN	3.75800	4.25553	4.00677
52 GRGN	12.94663	32.10487	22.52576
COUNTS	20.	20.	40.

STANDARD DEVIATIONS

VARIABLE	GROUP = NARRAT	EXPOSI	ALL GPS.
41 NNGN	21.86624	24.07884	22.99915
42 NAGN	34.69722	54.20468	45.50842
43 NGGN	27.66235	56.60591	44.55009
44 NRGN	8.51447	11.79059	10.71314
45 APGN	5.35147	5.38928	5.37041
46 PPGN	24.88135	44.78316	36.22577
47 NFGN	4.45436	6.35197	5.48604
48 PAGN	13.48046	17.52156	15.63214
49 CLGN	17.83818	17.28937	17.56590
50 IFGN	11.09034	19.85928	16.08395
51 FSGN	4.19750	4.54778	4.37614
52 GRGN	8.14374	20.47563	15.58158

COEFFICIENTS OF VARIATION

VARIABLE	GROUP = NARRAT	EXPOSI	ALL GPS.
41 NNGN	0.48991	0.53271	0.51204
42 NAGN	0.34822	0.26097	0.29614
43 NGGN	0.31391	0.44682	0.41463
44 NRGN	0.58473	0.53762	0.56086
45 APGN	1.10214	1.02651	1.06286
46 PPGN	0.55077	0.50576	0.54181
47 NFGN	1.22773	0.87659	1.00895
48 PAGN	0.81454	0.98952	0.91264
49 CLGN	0.41393	0.48862	0.44766
50 IFGN	0.79364	0.93434	0.91311
51 FSGN	1.11695	1.06867	1.09219
52 GRGN	0.62902	0.63777	0.69172

NOMI.MODE DISCRIMINANT

WITHIN CORRELATION MATRIX

		NNGN 41	NAGN 42	NGGN 43	NRGN 44	APGN 45	PPGN 46	NFGN 47	PAGN 48	CLGN 49
NNGN	41	1.00000								
NAGN	42	0.17736	1.00000							
NGGN	43	-0.10761	0.22781	1.00000						
NRGN	44	-0.20327	0.35952	0.18864	1.00000					
APGN	45	-0.02799	0.17662	0.16085	0.10945	1.00000				
PPGN	46	0.47996	0.46862	0.02346	0.14453	-0.16678	1.00000			
NFGN	47	-0.02633	0.15376	0.38589	0.10897	0.16098	0.04213	1.00000		
PAGN	48	0.52350	0.39299	-0.14320	-0.07414	-0.15000	0.55263	-0.02219	1.00000	
CLGN	49	-0.09546	-0.12998	-0.12198	0.22314	-0.14470	0.01573	-0.10497	-0.18833	1.00000
IFGN	50	-0.30364	-0.12697	0.45173	0.19390	0.01799	-0.14096	0.14585	-0.25728	0.15857
FSGN	51	-0.18628	-0.02441	0.13395	0.27487	0.04424	-0.14340	0.14490	-0.11929	0.30142
GRGN	52	0.04258	0.39550	0.02881	0.36358	0.12041	0.28089	0.06775	0.32289	0.24033

		IFGN 50	FSGN 51	GRGN 52
IFGN	50	1.00000		
FSGN	51	0.28104	1.00000	
GRGN	52	-0.17781	-0.14251	1.00000

WITHIN COVARIANCE MATRIX

		NNGN 41	NAGN 42	NGGN 43	NRGN 44	APGN 45	PPGN 46	NFGN 47	PAGN 48	CLGN 49
NNGN	41	528.96275								
NAGN	42	185.63220	2071.02481							
NGGN	43	-110.25792	461.87290	1984.71922						
NRGN	44	-50.08496	175.27960	90.03353	114.77168					
APGN	45	-3.45705	43.16687	38.48495	6.29685	28.84135				
PPGN	46	399.88179	772.55798	37.86029	56.08938	-32.44597	1312.30836			
NFGN	47	-3.32263	38.38802	94.31334	6.40428	4.74295	8.37310	30.09676		
PAGN	48	188.21286	279.56976	-99.72658	-12.41685	-12.59234	312.94493	-1.90326	244.36456	
CLGN	49	-38.56614	-103.90380	-95.45869	41.99134	-13.65049	10.00748	-10.11525	-51.71467	308.56244
IFGN	50	-112.32114	-92.93625	323.68668	33.41085	1.55413	-82.13169	12.86922	-64.68645	44.80218
FSGN	51	-18.74882	-4.86073	26.11447	12.88678	1.03981	-22.73239	3.47880	-8.16054	23.17047
GRGN	52	15.26076	280.44988	19.99880	60.69207	10.07569	158.55183	5.79098	78.64787	65.78007

		IFGN 50	FSGN 51	GRGN 52
IFGN	50	258.69427		
FSGN	51	19.78105	19.15071	
GRGN	52	-44.56207	-9.71738	242.78655

178

179

BMDP7M NOMI.MODE DISCRIMINANT

STEP NUMBER 0

VARIABLE	F TO REMOVE DF= 1 38	FORCE LEVEL	TOLERANCE

VARIABLE	F TO ENTER DF= 1 38	FORCE LEVEL	TOLERANCE
41 NNGN	0.006	1	1.000000
42 NAGN	56.384	1	1.000000
43 NGGN	7.526	1	1.000000
44 NRGN	2.791	1	1.000000
45 APGN	0.054	1	1.000000
46 PPGN	14.333	1	1.000000
47 NFGN	4.348	1	1.000000
48 PAGN	0.055	1	1.000000
49 CLGN	1.927	1	1.000000
50 IFGN	2.049	1	1.000000
51 FSGN	0.129	1	1.000000
52 GRGN	15.118	1	1.000000

STEP NUMBER 1
VARIABLE ENTERED 42 NAGN

VARIABLE	F TO REMOVE DF= 1 38	FORCE LEVEL	TOLERANCE
42 NAGN	56.384	1	1.000000

VARIABLE	F TO ENTER DF= 1 37	FORCE LEVEL	TOLERANCE
41 NNGN	0.636	1	0.968545
43 NGGN	0.441	1	0.948101
44 NRGN	0.477	1	0.870747
45 APGN	0.484	1	0.968804
46 PPGN	0.036	1	0.780396
47 NFGN	0.348	1	0.976358
48 PAGN	3.422	1	0.845561
49 CLGN	0.068	1	0.983106
50 IFGN	2.266	1	0.983879
51 FSGN	0.116	1	0.999405
52 GRGN	0.392	1	0.843577

U-STATISTIC OR WILKS' LAMBDA 0.4026107 DEGREES OF FREEDOM 1 1 38
APPROXIMATE F-STATISTIC 56.384 DEGREES OF FREEDOM 1.00 38.00

F - MATRIX DEGREES OF FREEDOM = 1 38

	NARRAT
EXPOSI	56.38

CLASSIFICATION FUNCTIONS

GROUP = VARIABLE	NARRAT	EXPOSI
42 NAGN	0.04811	0.10029
CONSTANT	-3.09008	-11.10829

CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP - NARRAT	EXPOSI
NARRAT	95.0	19	1
EXPOSI	90.0	2	18
TOTAL	92.5	21	19

BMDP7M NONI.MODE DISCRIMINANT

GROUP	NARRAT	INCORRECT CLASSIFICATIONS	MAHALANOBIS D-SQUARE FROM AND POSTERIOR PROBABILITY FOR GROUP - NARRAT	EXPOSI
CASE				
1			0.5 0.743	2.7 0.257
2			0.0 0.951	5.9 0.049
3			0.0 0.922	5.0 0.078
4		EXPOSI	4.7 0.090	0.0 0.910
5			0.4 0.986	8.9 0.014
6			0.0 0.930	5.2 0.070
7			0.8 0.638	2.0 0.362
8			0.0 0.912	4.7 0.088
9			0.0 0.953	6.0 0.047
10			0.2 0.846	3.6 0.154
11			0.4 0.787	3.0 0.213
12			0.1 0.975	7.4 0.025
13			0.4 0.986	8.9 0.014
14			0.1 0.976	7.5 0.024
15			0.1 0.976	7.5 0.024
16			0.8 0.993	10.7 0.007
17			0.1 0.881	4.1 0.119
18			0.2 0.980	7.9 0.020
19			1.1 0.995	11.8 0.005
20			0.8 0.993	10.9 0.007
GROUP	EXPOSI		NARRAT	EXPOSI
CASE				
21		NARRAT	1.3 0.536	1.6 0.464
22			1.6 0.449	1.2 0.551
23			33.7 0.000	11.8 1.000
24			2.7 0.253	0.5 0.747
25			7.9 0.020	0.2 0.980
26			16.9 0.001	3.0 0.999
27			4.9 0.082	0.0 0.918
28			3.0 0.219	0.4 0.781
29			3.5 0.161	0.2 0.839
30			4.1 0.123	0.1 0.877
31			4.9 0.080	0.0 0.920
32			6.1 0.045	0.0 0.955
33		NARRAT	1.0 0.604	1.9 0.396
34			1.8 0.402	1.0 0.598
35			11.7 0.005	1.1 0.995
36			6.4 0.040	0.0 0.960
37			8.6 0.016	0.3 0.984
38			2.1 0.340	0.8 0.660
39			2.7 0.247	0.5 0.753
40			14.7 0.002	2.1 0.998

EIGENVALUES

1.48379

CUMULATIVE PROPORTION OF TOTAL DISPERSION

1.00000

CANONICAL CORRELATIONS

0.77291

VARIABLE	COEFFICIENTS FOR CANONICAL VARIABLES
42 NAGN	-0.02197
CONSTANT	3.37676

GROUP	CANONICAL VARIABLES EVALUATED AT GROUP MEANS
NARRAT	1.18727
EXPOSI	-1.18727

POINTS TO BE PLOTTED

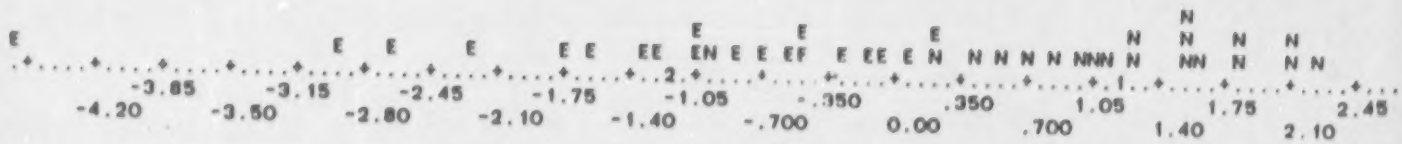
GROUP	MEAN COORDINATES		SYMBOL FOR CASES	SYMBOL FOR MEAN
NARRAT	1.19	0.0	N	1
EXPOSI	-1.19	0.0	E	2

GROUP NARRAT CASE	CAN.V	CASE	CAN.V
1	0.45	11	0.55
2	1.25	12	1.54
3	1.04	13	1.79
4	-0.98	14	1.56
5	1.79	15	1.56
6	1.09	16	2.08
7	0.24	17	0.84
8	0.98	18	1.63
9	1.26	19	2.25
10	0.72	20	2.11

GROUP EXPOSI CASE	CAN.V	CASE	CAN.V
21	0.06	31	-1.03
22	-0.09	32	-1.29
23	-4.62	33	0.18
24	-0.46	34	-0.17
25	-1.63	35	-2.23
26	-2.93	36	-1.33
27	-1.02	37	-1.75
28	-0.54	38	-0.28
29	-0.70	39	-0.47
30	-0.83	40	-2.64

BMDP7M NONI.MODE DISCRIMINANT

HISTOGRAM OF CANONICAL VARIABLE



Appendix M

Results of discriminant analysis on adverbial construction between two modes of writing

BMDP7M ADV.MODE DISCRIMINANT

MEANS

VARIABLE	GROUP = NARRAT	EXPOSI	ALL GPS.
29 GCLT	30.46304	22.05986	26.26144
30 GCLO	23.07304	55.15970	39.11638
31 GSAI	1.78299	0.0	0.89150
32 GSAA	3.25821	4.18946	3.72383
33 GSAC	15.61741	52.67766	34.14754
34 GSAP	8.41260	20.68599	14.54924
35 GSAO	3.78570	7.43105	5.60838
36 GANF	31.84639	60.51056	46.17848
COUNTS	20.	20.	40.

STANDARD DEVIATIONS

VARIABLE	GROUP = NARRAT	EXPOSI	ALL GPS.
29 GCLT	14.50654	11.58378	13.12672
30 GCLO	14.46130	20.85333	17.94421
31 GSAI	3.22113	0.0	2.27769
32 GSAA	4.24458	6.07632	5.24109
33 GSAC	16.23795	20.60706	18.55156
34 GSAP	7.89910	11.65519	9.95588
35 GSAO	3.62722	7.56044	5.92946
36 GANF	13.58285	25.33493	20.32674

COEFFICIENTS OF VARIATION

VARIABLE	GROUP = NARRAT	EXPOSI	ALL GPS.
29 GCLT	0.47620	0.52511	0.49985
30 GCLO	0.62676	0.37805	0.45874
31 GSAI	1.80659	0.0	2.55490
32 GSAA	1.30273	1.45038	1.40744
33 GSAC	1.03973	0.39119	0.54328
34 GSAP	0.93897	0.56343	0.68429
35 GSAO	0.95814	1.01741	1.05725
36 GANF	0.42651	0.41869	0.44018

BMDP7M ADV.MODE DISCRIMINANT

WITHIN CORRELATION MATRIX

		GCLT 29	GCLO 30	GSAI 31	GSAA 32	GSAC 33	GSAP 34	GSAO 35	GANF 36
GCLT	29	1.00000							
GCLO	30	-0.12949	1.00000						
GSAI	31	0.10707	0.05861	1.00000					
GSAA	32	-0.02310	0.54639	-0.02166	1.00000				
GSAC	33	-0.24186	0.14997	-0.08797	0.13852	1.00000			
GSAP	34	0.10503	0.03899	-0.06560	0.08159	0.16763	1.00000		
GSAO	35	-0.23925	0.22225	0.06964	0.56105	0.29388	0.30514	1.00000	
GANF	36	-0.06797	0.18222	0.14290	0.33348	0.27764	0.16267	0.34525	1.00000

WITHIN COVARIANCE MATRIX

		GCLT 29	GCLO 30	GSAI 31	GSAA 32	GSAC 33	GSAP 34	GSAO 35	GANF 36
GCLT	29	172.31194							
GCLO	30	-30.50114	321.99589						
GSAI	31	3.20135	2.39557	5.18786					
GSAA	32	-1.58822	51.38706	-0.25861	27.46912				
GSAC	33	-58.89857	49.92331	-3.71719	13.46830	344.16192			
GSAP	34	13.72594	6.96632	-1.48749	4.25731	30.96000	99.11967		
GSAO	35	-18.62226	23.64684	0.94059	17.43557	32.32703	18.01323	38.15854	
GANF	36	-18.13616	66.46346	6.61617	35.52687	104.69489	32.91941	41.61165	413.17729

STEP NUMBER 0

VARIABLE	F TO REMOVE DF= 1 38	FORCE LEVEL	TOLERANCE

VARIABLE	F TO ENTER DF= 1 38	FORCE LEVEL	TOLERANCE
29 GCLT	4.098	1	1.000000
30 GCLO	31.974	1	1.000000
31 GSAI	6.128	1	1.000000
32 GSAA	0.316	1	1.000000
33 GSAC	39.907	1	1.000000
34 GSAP	15.198	1	1.000000
35 GSAO	3.780	1	1.000000
36 GANF	19.886	1	1.000000

BMDP7M ADV.MODE DISCRIMINANT

STEP NUMBER 1
VARIABLE ENTERED 33 GSAC

VARIABLE	F TO REMOVE DF= 1 38	FORCE LEVEL	TOLERANCE
33 GSAC	39.907	1	1.000000

VARIABLE	F TO ENTER DF= 1 37	FORCE LEVEL	TOLERANCE
29 GCLT	0.124	1	0.941504
30 GCLO	10.765	1	0.977510
31 GSAI	1.764	1	0.992261
32 GSAA	0.047	1	0.980813
34 GSAP	3.940	1	0.971902
35 GSAO	0.004	1	0.913635
36 GANF	3.766	1	0.922918

U-STATISTIC OR WILKS' LAMBDA 0.4877681 DEGREES OF FREEDOM 1 1 38
APPROXIMATE F-STATISTIC 39.907 DEGREES OF FREEDOM 1.00 38.00

F - MATRIX DEGREES OF FREEDOM = 1 38

	NARRAT
EXPOSI	39.91

CLASSIFICATION FUNCTIONS

GROUP =	NARRAT	EXPOSI
VARIABLE		
33 GSAC	0.04538	0.15306
CONSTANT	-1.04748	-4.72459

STEP NUMBER 2
VARIABLE ENTERED 30 GCLO

VARIABLE	F TO REMOVE DF= 1 37	FORCE LEVEL	TOLERANCE
30 GCLO	10.765	1	0.977510
33 GSAC	16.181	1	0.977510

VARIABLE	F TO ENTER DF= 1 36	FORCE LEVEL	TOLERANCE
29 GCLT	0.001	1	0.932614
31 GSAI	1.861	1	0.986986
32 GSAA	4.148	1	0.698179
34 GSAP	2.832	1	0.971705
35 GSAO	0.241	1	0.881159
36 GANF	1.632	1	0.902701

U-STATISTIC OR WILKS' LAMBDA 0.3778279 DEGREES OF FREEDOM 2 1 38
APPROXIMATE F-STATISTIC 30.464 DEGREES OF FREEDOM 2.00 37.00

F - MATRIX DEGREES OF FREEDOM = 2 37

	NARRAT
EXPOSI	30.46

BMDP7M ADV.MODE DISCRIMINANT

CLASSIFICATION FUNCTIONS

GROUP =	NARRAT	EXPOSI
VARIABLE		
30 GCLO	0.06611	0.15097
33 GSAC	0.03579	0.13116
CONSTANT	-1.73526	-8.31151

STEP NUMBER 3
VARIABLE ENTERED 32 GSAA

VARIABLE	F TO REMOVE DF= 1 36	FORCE LEVEL	TOLERANCE
30 GCLO	15.762	1	0.695828
32 GSAA	4.148	1	0.698179
33 GSAC	15.058	1	0.972947

VARIABLE	F TO ENTER DF= 1 35	FORCE LEVEL	TOLERANCE
29 GCLT	0.013	1	0.927367
31 GSAI	1.922	1	0.983674
34 GSAP	2.863	1	0.967992
35 GSAO	0.461	1	0.623020
36 GANF	3.196	1	0.833738

U-STATISTIC OR WILKS' LAMBDA 0.3387950 DEGREES OF FREEDOM 3 1 38
APPROXIMATE F-STATISTIC 23.420 DEGREES OF FREEDOM 3.00 36.00

F - MATRIX DEGREES OF FREEDOM = 3 36

	NARRAT
EXPOSI	23.42

CLASSIFICATION FUNCTIONS

GROUP =	NARRAT	EXPOSI
VARIABLE		
30 GCLO	0.07119	0.18466
32 GSAA	-0.03237	-0.27818
33 GSAC	0.03632	0.13571
CONSTANT	-1.74531	-9.05354

CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP - NARRAT	EXPOSI
NARRAT	90.0	18	2
EXPOSI	85.0	3	17
TOTAL	87.5	21	19

BMDP7M ADV.MODE DISCRIMINANT

GROUP	NARRAT	INCORRECT CLASSIFICATIONS	MAHALANOBIS D-SQUARE FROM AND POSTERIOR PROBABILITY FOR GROUP - NARRAT	EXPOSI
CASE				
1			0.7 0.992	10.2 0.008
2			1.0 0.998	13.2 0.002
3		EXPOSI	3.7 0.181	0.7 0.819
4			0.6 0.993	10.5 0.007
5			4.6 0.980	12.4 0.020
6			0.5 0.987	9.2 0.013
7			1.5 0.977	9.0 0.023
8			0.3 0.978	7.9 0.022
9		EXPOSI	9.0 0.142	5.4 0.858
10			1.2 0.893	5.5 0.107
11			2.9 0.994	13.2 0.006
12			1.3 0.998	13.9 0.002
13			1.1 0.998	13.1 0.002
14			0.6 0.981	8.4 0.019
15			0.8 0.987	9.4 0.013
16			5.2 0.822	8.3 0.178
17			0.7 0.995	11.3 0.005
18			1.2 0.816	4.2 0.184
19			1.8 0.999	15.9 0.001
20			1.2 0.930	6.4 0.070
GROUP	EXPOSI		NARRAT	EXPOSI
CASE				
21		NARRAT	1.7 0.812	4.6 0.188
22			3.4 0.333	2.0 0.667
23			20.9 0.002	8.2 0.998
24			3.8 0.254	1.7 0.746
25			18.1 0.046	12.1 0.954
26			17.4 0.001	4.3 0.999
27		NARRAT	2.1 0.587	2.8 0.413
28			9.7 0.011	0.8 0.989
29			5.6 0.250	3.4 0.750
30			5.2 0.160	1.8 0.840
31			15.5 0.001	2.3 0.999
32			14.0 0.009	4.6 0.991
33		NARRAT	2.2 0.634	3.3 0.366
34			10.9 0.013	2.3 0.987
35			15.4 0.015	7.0 0.985
36			19.5 0.000	3.5 1.000
37			21.0 0.000	4.3 1.000
38			19.4 0.000	3.6 1.000
39			10.0 0.010	0.8 0.990
40			6.7 0.051	0.8 0.949

EIGENVALUES

1.95164

CUMULATIVE PROPORTION OF TOTAL DISPERSION

1.00000

BMDP7M ADV.MODE DISCRIMINANT

CANONICAL CORRELATIONS

0.81315

VARIABLE	COEFFICIENTS FOR CANONICAL VARIABLES
30 GCLO	-0.04534
32 GSAA	0.09026
33 GSAC	-0.03650
CONSTANT	2.68362

GROUP	CANONICAL VARIABLES EVALUATED AT GROUP MEANS
NARRAT	1.36164
EXPOSI	-1.36164

POINTS TO BE PLOTTED

GROUP	MEAN COORDINATES		SYMBOL FOR CASES	SYMBOL FOR MEAN
NARRAT	1.36	0.0	N	1
EXPOSI	-1.36	0.0	E	2

GROUP NARRAT

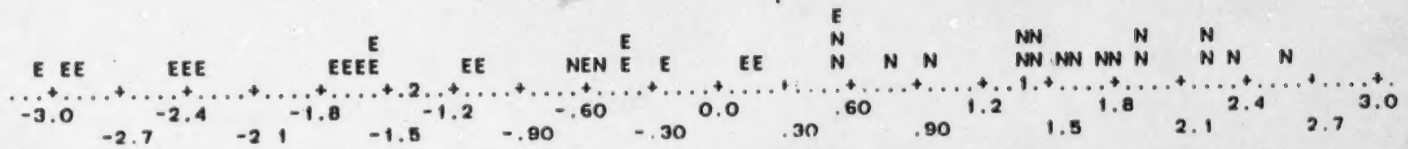
CASE	CAN.V	CASE	CAN.V
1	1.75	11	1.91
2	2.24	12	2.32
3	-0.55	13	2.22
4	1.82	14	1.44
5	1.42	15	1.58
6	1.60	16	0.56
7	1.38	17	1.95
8	1.40	18	0.55
9	-0.66	19	2.58
10	0.78	20	0.95

GROUP EXPOSI

CASE	CAN.V	CASE	CAN.V
21	0.54	31	-2.43
22	-0.26	32	-1.73
23	-2.33	33	0.20
24	-0.40	34	-1.59
25	-1.12	35	-1.54
26	-2.41	36	-2.94
27	0.13	37	-3.07
28	-1.64	38	-2.90
29	-0.40	39	-1.67
30	-0.61	40	-1.07

BMDP7M ADV.MODE DISCRIMINANT

HISTOGRAM OF CANONICAL VARIABLE



Appendix N

Results of discriminant analysis on coordinate construction between two modes of writing

BMDP7M COOR.MODE DISCRIMINANT

MEANS

GROUP =	NARRAT	EXPOSI	ALL GPS.
VARIABLE			
14 GNOM	28.65784	61.23805	44.94794
15 GMOD	11.27023	39.95483	25.61253
16 GPRD	35.64291	61.12250	48.38271
COUNTS	20.	20.	40.

STANDARD DEVIATIONS

GROUP =	NARRAT	EXPOSI	ALL GPS.
VARIABLE			
14 GNOM	24.32831	31.55190	28.17258
15 GMOD	9.12740	18.93385	14.86271
16 GPRD	12.75763	24.93700	19.80670

COEFFICIENTS OF VARIATION

GROUP =	NARRAT	EXPOSI	ALL GPS.
VARIABLE			
14 GNOM	0.84892	0.51523	0.62678
15 GMOD	0.80987	0.47388	0.58029
16 GPRD	0.35793	0.40798	0.40938

STEP NUMBER 0

VARIABLE	F TO REMOVE DF= 1 39	FORCE LEVEL	TOLERANCE	VARIABLE	F TO ENTER DF= 1 38	FORCE LEVEL	TOLERANCE
				14 GNOM	13.374	1	1.000000
				15 GMOD	37.248	1	1.000000
				16 GPRD	16.548	1	1.000000

BMDP7M COOR.MODE DISCRIMINANT

STEP NUMBER 1
VARIABLE ENTERED 15 GMOD

VARIABLE	F TO REMOVE	FORCE LEVEL	TOLERANCE	VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	1 38			DF=	1 37		
15 GMOD	37.248	1	1.000000	14 GNOM	1.156	1	0.866526
				16 GPRD	4.522	1	0.968470

U-STATISTIC OR WILKS' LAMBDA 0.5049984 DEGREES OF FREEDOM 1 1 38
APPROXIMATE F-STATISTIC 37.248 DEGREES OF FREEDOM 1.00 38.00

F - MATRIX DEGREES OF FREEDOM = 1 38

	NARRAT
EXPOSI	37.25

CLASSIFICATION FUNCTIONS

GROUP =	NARRAT	EXPOSI
VARIABLE		
15 GMOD	0.05102	0.18087
CONSTANT	-0.98065	-4.30651

STEP NUMBER 2
VARIABLE ENTERED 16 GPRD

VARIABLE	F TO REMOVE	FORCE LEVEL	TOLERANCE	VARIABLE	F TO ENTER	FORCE LEVEL	TOLERANCE
DF=	1 37			DF=	1 36		
15 GMOD	20.278	1	0.968470	14 GNOM	0.422	1	0.837493
16 GPRD	4.522	1	0.968470				

U-STATISTIC OR WILKS' LAMBDA 0.4500046 DEGREES OF FREEDOM 2 1 38
APPROXIMATE F-STATISTIC 22.611 DEGREES OF FREEDOM 2.00 37.00

F - MATRIX DEGREES OF FREEDOM = 2 37

	NARRAT
EXPOSI	22.61

CLASSIFICATION FUNCTIONS

GROUP =	NARRAT	EXPOSI
VARIABLE		
15 GMOD	0.03048	0.14869
16 GPRD	0.08679	0.13599
CONSTANT	-2.41169	-7.81966

CLASSIFICATION MATRIX

GROUP	PERCENT CORRECT	NUMBER OF CASES CLASSIFIED INTO GROUP -	
		NARRAT	EXPOSI
NARRAT	100.0	20	0
EXPOSI	80.0	4	16
TOTAL	90.0	24	16

BMDP7M COOR.MODE DISCRIMINANT

GROUP	NARRAT	INCORRECT CLASSIFICATIONS	MAHALANOBIS D-SQUARE FROM AND POSTERIOR PROBABILITY FOR GROUP - NARRAT	EXPOSI
CASE				
1			0.7 0.981	8.6 0.019
2			0.8 0.916	5.6 0.084
3			1.7 0.824	4.8 0.176
4			0.8 0.593	1.6 0.407
5			0.6 0.937	6.1 0.063
6			0.2 0.803	3.1 0.197
7			0.2 0.951	6.1 0.049
8			3.2 0.781	5.8 0.219
9			1.4 0.904	5.9 0.096
10			2.0 0.503	2.1 0.497
11			0.6 0.979	8.3 0.021
12			0.6 0.934	5.9 0.066
13			0.6 0.982	8.6 0.018
14			0.6 0.815	3.5 0.185
15			0.9 0.760	3.2 0.240
16			0.3 0.931	5.5 0.069
17			0.0 0.934	5.3 0.066
18			0.3 0.973	7.5 0.027
19			0.3 0.967	7.0 0.033
20			0.1 0.906	4.6 0.094
GROUP	EXPOSI		NARRAT	EXPOSI
CASE				
21		NARRAT	0.5 0.825	3.6 0.175
22			3.6 0.292	1.8 0.708
23			7.3 0.030	0.3 0.970
24			2.5 0.269	0.5 0.731
25			23.7 0.000	7.4 1.000
26		NARRAT	0.7 0.805	3.5 0.195
27			8.2 0.091	3.6 0.909
28			17.2 0.017	9.1 0.983
29			4.8 0.112	0.7 0.888
30			9.0 0.019	1.0 0.981
31		NARRAT	0.0 0.915	4.8 0.085
32			6.8 0.046	0.7 0.954
33			7.5 0.146	4.0 0.854
34			22.0 0.000	6.4 1.000
35		NARRAT	1.4 0.572	2.0 0.428
36			16.7 0.002	4.1 0.998
37			6.9 0.153	3.5 0.847
38			3.8 0.142	0.2 0.858
39			4.4 0.239	2.1 0.761
40			5.8 0.068	0.6 0.932

EIGENVALUES

1.22220

CUMULATIVE PROPORTION OF TOTAL DISPERSION

1.00000

CANONICAL CORRELATIONS

0.74162

VARIABLE	COEFFICIENTS FOR CANONICAL VARIABLES
15 GMOD	-0.05485
16 GPRD	-0.02283
CONSTANT	2.50941

GROUP	CANONICAL VARIABLES EVALUATED AT GROUP MEANS
NARRAT	1.07754
EXPOSI	-1.07754

POINTS TO BE PLOTTED

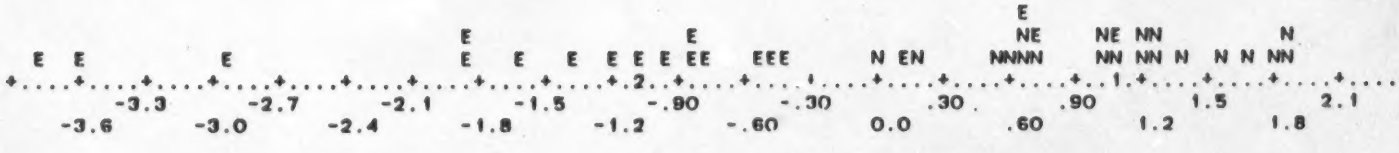
GROUP	MEAN COORDINATES		SYMBOL FOR CASES	SYMBOL FOR MEAN
NARRAT	1.08	0.0	N	1
EXPOSI	-1.08	0.0	E	2

GROUP NARRAT CASE	CAN.V	CASE	CAN.V
1	1.83	11	1.78
2	1.11	12	1.23
3	0.72	13	1.85
4	0.18	14	0.69
5	1.25	15	0.53
6	0.65	16	1.21
7	1.37	17	1.23
8	0.59	18	1.66
9	1.04	19	1.57
10	0.01	20	1.05

GROUP EXPOSI CASE	CAN.V	CASE	CAN.V
21	0.72	31	1.10
22	-0.41	32	-1.41
23	-1.61	33	-0.82
24	-0.46	34	-3.62
25	-3.79	35	0.14
26	0.66	36	-2.92
27	-1.07	37	-0.79
28	-1.87	38	-0.84
29	-0.96	39	-0.54
30	-1.84	40	-1.22

BMDP7M COOR.MODE DISCRIMINANT

HISTOGRAM OF CANONICAL VARIABLE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